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INDIVIDUAL VARIATION IN RESPONSE TO DRUGS*

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Every practitioner is familiar with the wide variation shown by patients in their response to drugs. Therapeutic success is indeed dependent on the adjustment of standard methods and doses to the needs and peculiarities of the individual patient. Such work makes special demands on clinical skill and experience, and here the general practitioner has a special advantage on account of his knowledge of the patient's peculiarities. It is sometimes suggested that medical practice is degenerating into an automatic process whereby diagnosis is supplied by a laboratory and the appropriate remedy by a therapeutic index. The individual variation of patients will, however, always constitute a factor limiting such tendencies, and is a sure safeguard against the replacement of practitioners of medicine by automatic machines.

The actual range of individual variation tends to be ignored because most therapeutic methods are such that the amount of drug given can be adjusted to the individual need. If the same dose of a drug is given to every individual in a large population then the extent of individual variation is at once revealed. Therapeutic methods of this type, however, are comparatively rare.

The usual method adopted in the administration of powerful drugs is to start with a small dose and to observe the effects produced on the patient before working up to a full dose. The administration of a volatile anaesthetic is an example of the manner in which it is usual to correct individual variation, since the anaesthetist concentrates his attention on each patient, and by suitable adjustment of the dosage secures a uniform response. Most well-established clinical methods of drug adminstration are of this type, and hence the range of individual variation is masked, and indeed is in danger of being forgotten. This is evidenced by the fact that from time to time therapeutic methods are recommended which involve giving patients a full dose of some potent drug without providing any opportunity for first determining their individual response to it. In most cases such a risk is unnecessary, but in some it is very desirable to produce a full therapeutic action as quickly as possible, and therefore to know the probable limits of human variation. The chief problem is to ascertain what ratio between the average lethal dose and the therapeutic dose represents a reasonable margin of safety in the use of a drug. The extent of the margin actually desirable is a matter of opinion, but it will be generally agreed that if a therapeutic measure involves the chance of producing a serious toxic effect even in one case in 1,000, it must be considered dangerous. This chance will therefore be taken as representing the limit of justifiable risks.

The determination of the incidence of severe toxic effects is obviously a problem which the clinician is glad to leave to the laboratory worker, and hence no apology is needed for the discussion of evidence provided by animal experiments. In order to measure directly the occurrence of occasional toxic actions it is necessary to use very large populations; considerations of cost preclude the employment of any but small animals, and therefore the discussion of individual variation must be based chiefly on experiments made on large numbers of rats and mice. It is obvious that there is a very wide difference between mice and men; but for the reasons mentioned the evidence available is limited, and it is necessary to make as much use as possible of the existing material.

Individual Variation in Animal Populations

The lethal dose of a drug is a primary pharmacological constant, and usually is one of the first characteristics to be determined. Until about twenty years ago the method employed was to give varying doses to a dozen or a few dozen animals, and to term the smallest dose which produced death the minimum lethal dose. Such doses were stated as mg./kg., and thus correction was made for variations in body weight. The introduction of the biological standardization of drugs necessitated increased accuracy in such methods, and as soon as systematic investigations were made it was found that animals showed a considerable individual variation in their responses to drugs, and that consequently the methods that had been in use for a century were inherently inaccurate.

The outstanding results of research of this type are as follows. All populations of animals show individual variation to all drugs. The extent of the scatter of the individual variation depends both on the nature of the population and on the drug. The scatter can be reduced by making the population as uniform as possible—for instance, by the use of inbred animals instead of stock animals, and by the use of animals similar in sex, body weight, and age. The nature of the diet is another important factor—for example, vitamin deficiency increases the susceptibility of animals to many drugs (Wien, 1936). Finally, it is essential to use only animals in good health. Even when all of these precautions are taken animals still show a wide variation in their response to drugs. For example, Poe, Suchy, and Witt (1936) measured the lethal dose of strychnine salts for rats. They used about 4,000

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animals, and therefore their results are statistically significant. In the case of adult male rats the average or mean lethal dose (50 per cent. mortality) was 2.25 mg./kg., but 4 per cent. were killed by 1.5 mg./kg., and a similar number survived 3.5 mg./kg. They found, moreover, that the mean lethal dose for adult females was 60 per cent. of that for males, whilst the mean lethal dose for young animals was about 70 per cent. that for adult animals. In the case, therefore, of adult animals of mixed sexes 4 per cent. were killed by about one-fourth the dose which 4 per cent. survived. In view of this result it is not surprising to note that previous workers who had estimated the minimum lethal dose for strychnine on rats by the old method of using one or two dozen animals had obtained results varying from 0.7 to 3.4 mg./kg.

The scatter shown in the individual variation of the response to drugs unfortunately differs very widely in the case of different substances. The simplest method of describing the scatter is by measuring the coefficient of variation. The "standard deviation" in the response to a drug is approximately equal to the difference between the doses producing 50 per cent. mortality (mean lethal dose) and that producing 16 per cent. mortality. (For the sake of brevity the mean lethal dose will be termed M.L.D.) The difference between these two doses expressed as the percentage of the M.L.D. is approximately equal to the "coefficient of variation." Examination of characteristic curves which relate dosage and percentage of mortality show that these vary from steep symmetrical sigmoid curves to highly skewed curves approximating in form to a hyperbola. The coefficient of variation in the former case may be as low as 10 per cent., whilst in the latter case it may be as much as 50 per cent. The occurrence of curves of the latter type raises the following difficulty. Our aim is to discover what percentage of the M.L.D. is likely to be safe—that is, to kill less than one animal in 1,000. The determination of this fact by direct experiment would involve the use of at least 10,000 animals for a single drug; but if the shape of the characteristic curve from 10 per cent. to 90 per cent. mortality is established, and the laws of probability can be applied, then it is possible by extrapolation to calculate the chance of a mortality of 1 in 1,000. If a variation is due to a large number of independent factors of similar importance then the distribution follows the "normal curve of error"; and if, for example, 90 per cent. of the M.L.D. kills 16 per cent., then the standard deviation (σ) is $100 - 90 = 10$, and $100 - 3\sigma = 100 - 30 = 70$ per cent. of the M.L.D. will kill about one individual in 1,000.

This simple calculation cannot, however, be applied to highly skewed curves, since it produces the absurd result that a considerable proportion of a population is killed by a dose of less than nothing. It has been shown by Gaddum (1933) that reasonable results can be obtained if characteristic curves are plotted with the dosage on the logarithmic scale. This converts the skewed curves described above into sigmoid curves. In the case already mentioned a 16 per cent. mortality is produced by nine-tenths of the M.L.D., and according to this method of estimation 1 in 1,000 mortality would be produced by $(9/10)^3 = 73$ per cent. of the M.L.D. In this case the two methods of calculation give very similar results, but in a case where 16 per cent. mortality is produced by half the M.L.D. the usual method of calculation results in the absurd conclusion that 3 per cent. mortality is produced when the dose is *nil*, whereas the logarithmic method gives the possible result that 1 in 1,000 mortality is produced by $100 \times (\frac{1}{2})^3 = 12.5$ per cent. of the M.L.D.

The calculation of incidence of effects by plotting the factor causing the effect on a logarithmic scale is not a new suggestion, since its use was recommended and justified in the case of living populations by Galton and MacAlister as long ago as 1879. Table I gives a few typical results obtained with this method of calculation. These results show that although individual variation always occurs, yet, with carefully selected populations of rats, its range in the case of many important drugs is relatively narrow, and that in most of the cases quoted a dose equal to 40 per cent. of the M.L.D. is safe (that is, will not kill more than 1 in 10,000 individuals). The example of dysentery toxin proves, however, that certain poisons are inherently unsafe, since the individual variation is so great that a very small fraction of the mean lethal dose will suffice to kill susceptible individuals.

TABLE I

	Fraction of Mean Dose which should Produce Effect	
	Once in 1,000 Individuals	Once in 10,000 Individuals
Lethal actions :		
Digitalis on frogs	0.5	0.42
Neoarsphenamine on rats	0.56	0.5
Strychnine on rats	0.47	0.4
Thallium on rats..	0.47	0.39
Amytal on cats	0.5	0.42
Dysentery toxin on rats..	0.036	0.016
Insulin convulsions in mice	0.33	0.25

The drugs that are shown by animal experiments to be possibly safe are obviously of chief interest, and the problem is to estimate what proportion of the mean lethal human dose is safe therapeutically.

Human Lethal Dose

We are at once confronted with the difficulty that the mean lethal human dose is not known for any drug. In the case of a common poison such as strychnine textbooks of toxicology provide the following information. Several deaths have occurred when the dose taken was probably not more than 1/2 grain. Deaths from 1/4 grain have been reported, but the evidence is less certain. Recovery after 2 grains is fairly well established, and recovery after 3 or 4 grains has been reported. Obviously it is nearly always difficult, after the occurrence of a fatal case of poisoning, to obtain reliable information as to what dose has been taken. Furthermore, in the case of recovery it is always uncertain how much of the drug has been removed unabsorbed from the stomach. It is worth noting, however, that animal experiments with strychnine proved that there was a fourfold range of dosage between the least resistant and the most resistant 5 per cent. of a population, even when every endeavour had been made to exclude causes of variation. Hence there is no reason to suspect the statement that some adults have been killed with 1/2 grain of strychnine and others have recovered from 2 grains.

The animal experiments are of service in that they provide formal proof of the fact that the minimum lethal dose is a quantity which cannot be measured accurately. It is simply the smallest dose that has been observed to be followed by death, and in the case of any drug the greater the population observed the lower the value is likely to be.

It is therefore preferable in toxicology to describe the usually fatal dose, and to avoid the term minimum lethal dose.

Human Variation to Narcotics

Quantitative evidence regarding the extent of the variation of the response of patients to therapeutic doses of drugs is very scanty. In the case of the narcotics used for pre-anaesthetic medication a certain amount of accurate evidence exists, because drugs such as nembutal, sodium amytal, and evipan are given by slow intravenous injection until a constant response is produced. Such methods provide exceptionally accurate evidence regarding the relation between dosage and the incidence of a constant response in a human population. For example, Paxson (1932) measured the amount of sodium amytal (mg./kg.) needed to produce analgesia in fifty-five women during labour. His results show that 16 per cent. were narcotized by three-fourths of the median narcotic dose. This is a variation like that found for the lethal action of sodium amytal in cats, rabbits, and rats (Swanson and Page, 1927), and for the related compound sodium nembutal given intravenously to dogs and rats (Swanson and Shonle, 1931) and to rats alone (Gage, 1933). Variations of a similar extent were observed in these cases in respect to both the hypnotic and the lethal doses.

Similarly in the case of avertin given per rectum, the figures of Flörcken and Mues (1928) indicate that 50 per cent. of the population is narcotized by 80 per cent. of the dose needed to narcotize 84 per cent. The scatter as regards the proportion of a population of rats anaesthetized by graded doses of avertin (per rectum) is of similar extent (Lendle, 1928; Tunger, 1931; Gage, 1933). These facts permit the calculation of the extremes of response that are likely to be encountered in a population of 1,000. These are shown in Table II.

TABLE II

Ratio of Doses Producing Effect in 16 and 50% of Population (D_{16}/D_{50})	Percentage of Mean Dose (D_{50}) Producing Effect		Ratio *a*/*b*
	(*a*) In 0.1% Population	(*b*) In 99.9% Population	
0.75	42	237	1/5.6
0.8	51	200	1/3.9
0.9	73	137	1/1.9

Reports regarding the occurrence of exceptional responses to basal narcotics indicate variation within the scale shown in Table II. In the case of avertin Shipway (1936) found that 1,300 out of 1,500 cases were narcotized by doses between 0.09 and 0.1 g./kg., but that three cases (0.2 per cent.) required 0.12 g./kg. This distribution suggests a ratio D_{16}/D_{50} of a little less than 0.9.

In the case of evipan McNelis (1936) noted that in 1,000 cases one man required 4 grammes to produce anaesthesia, and that with one woman 0.9 gramme appeared to be an overdose. This is the type of result to be expected from a D_{16}/D_{50} ratio of 0.8.

These results indicate that the variation in human beings in response to narcotics is very similar to the variation which occurs in animal populations. It would appear that a D_{16}/D_{50} ratio of about 0.8 must be expected, and consequently in a thousand cases it is probable that the most resistant individual will require about four times the dose needed by the least resistant individual. This unavoidable and unpredictable human variation would seem to constitute an important limiting factor in basal narcosis. Those methods in which the dosage can be adjusted to the individual response would appear to be preferable to those in which a standard dose has to be given to all patients. The latter method is satisfactory in the majority of cases, but produces unfortunate results when individuals are encountered who represent the extreme of variation.

Blood Alcohol and Intoxication

The measurement of the concentration of alcohol in the blood seems to be a much more accurate and scientific method than the estimation of the degree of intoxication by clinical examination. It is important to note, however, that although the former method may indicate accurately the amount of alcohol that has been taken, it does not indicate the effect produced on the patient, because there is a wide individual variation in regard to alcohol concentration in the blood and intoxication. This is shown by the reports of Bogen (1927) and of Widmark (1932), which describe in 250 and 562 cases respectively both the blood concentration of alcohol and the result of clinical examination. The results agree in demonstrating that a concentration of alcohol in the blood of 1.2 mg. per 100 c.cm. produces intoxication in 50 per cent. of cases. Bogen's figures show that intoxication was not present in any case in which the alcoholic content was less than 1 mg. per 100 c.cm.; whilst Widmark found none below 0.8 mg. per 100 c.cm., but observed six cases of intoxication in thirty individuals in whom the blood concentration was between 0.8 and 1.0 mg. per 100 c.cm. At the other end of the scale Bogen's figures show one case in thirty-five not intoxicated with 4 to 5 mg. per 100 c.cm., whilst Widmark's figures give one case in twenty-nine not intoxicated by 2.5 mg. per 100 c.cm. The ratio between the alcohol concentration not intoxicating the most resistant individuals and that affecting the least resistant individuals was about fourteen to one in Bogen's series and three to one in Widmark's series.

Examination of the figures shows that they do not follow the ordinary laws of probability, for there appears to be a lower limit of about 0.8 mg. per 100 c.cm., below which intoxication never occurs; whilst a concentration of 1.2 mg. per 100 c.cm. produces intoxication in about 50 per cent. of the population, but the more resistant half of the population reveals a wide scatter.

Animal experiments give a relatively small variation in response to alcohol. For example, Lendle's (1928) figures suggest a D_{16}/D_{50} ratio of 0.9. The difference in the results obtained with men and with rats is easily explained on the assumption that there is little natural variation with regard to the effects of blood alcohol on cerebral functions, but that a certain proportion of the human population acquire tolerance. Incidentally the results obtained by Bogen and Widmark provide fairly clear proof that the variation in tolerance to alcohol, which is such a familiar fact, is not merely due to differences in the rate of absorption, but that in addition there is a considerable individual variation in the effect produced by alcohol in the blood on the functions of the brain.

Measurements of the relation between the quantity of alcohol drunk and the incidence of intoxication would probably show a much wider scatter of individual variation than do the figures under discussion, because of wide differences in the rate of absorption of alcohol from the alimentary canal. Bogen's figures disclose a wider scatter of variation in the resistant half of the population than do Widmark's figures, but even in the case of the latter the distribution indicates that one individual in 1,000

would not be intoxicated by about four times the blood alcohol concentration that intoxicates 50 per cent. of the population.

Massive Digitalis Therapy

Digitalis preparations are standardized biologically on cats and on frogs, and figures for the variation in response of large populations are available. These figures show a very uniform response. The ratio D_{16}/D_{50} is about 0.9, and hence a dose equal to 73 per cent. of the mean lethal dose would kill only one individual in 1,000. Such results suggest that massive digitalis therapy may be a relatively safe procedure. There is, however, a very wide difference between a population of healthy cats and a population of patients with heart disease of varying intensity. Animal experiments prove that this apparent uniformity in response is obtained only when acute toxic effects are observed. For example, Bauer (1933) gave cats one-half a lethal dose of digitoxin, and then measured the amount of ouabain required to produce death twenty-four or forty-eight hours later. The individual variation with this latter dose was far greater than that found for the acute lethal action of these drugs. The ratio D_{16}/D_{50} was about 0.75, which indicates that one animal in 1,000 would be killed by 42 per cent. of the M.L.D. Similarly Li and van Dyke (1936) measured the individual variation in respect of cumulative poisoning in frogs. They gave doses of digitalis glucosides on alternate days, and their figures reveal a wide variation in the sum of the doses needed to produce death. The ratio D_{16}/D_{50} is about 0.4, and in this case a mortality of 1 in 1,000 would probably be produced by 1/16 of the M.L.D. Even with healthy animals, therefore, the uniformity of response to digitalis glucosides ceases as soon as opportunity is allowed for the action produced to be influenced by such factors as rate of excretion, etc.

The variability of the response of patients to digitalis therapy is well known; the following quantitative data give an indication of the scatter that occurs.

Murray Lyon and Gilchrist (1927) measured the changes produced in the heart rate by massive digitalis therapy. Their results show that the reduction in heart rate in cases of auricular fibrillation may range from 20 to 100 beats per minute, and that the greater the initial rate the greater was the reduction. In their group of thirty-seven cases with an initial heart rate between 70 and 100 per minute the reduction varied from 18 to 45 per minute in fibrillating cases, and from 0 to 40 per minute in non-fibrillating cases. Alstead (1936) noted the daily dose of powdered digitalis that produced nausea in thirty-six patients. In two nausea was brought about by 1 grain daily in a week, whilst in twenty-two cases 2 grains daily did not produce nausea in two weeks. Figures such as these indicate a wide individual variation in the response of patients to digitalis. The scatter of the variation appears to resemble the scatter observed in cumulative experiments on animals much more closely than the relatively uniform responses met with when the acute lethal dose of digitalis for animals is measured.

The question of practical interest is the probable margin of safety in massive digitalis therapy. The existing evidence is admittedly imperfect, but it suggests that in different individuals there is likely to be at least a fourfold range in the quantity of a drug required to produce a given effect. Consequently it appears to be very improbable that any method will be found of judging *a priori* the dose needed accurately enough to ensure that the average therapeutic dose will not produce severe overdosage in the occasional patient who is abnormally sensitive.

Conclusion

Individual variation is an unattractive subject because its existence constitutes a limitation to therapeutic measures of an annoying and irrational character. If a therapeutic method has produced satisfactory results in a dozen cases it seems irrational that the same technique should have an undesirable effect in the next case on which it is tried. It seems probable that the extent of individual variation is consistently under-estimated, because if an individual representing an extreme of variation happens to be encountered in a small group the result is apt to be discounted as an accident. The evidence available suggests, however, that whenever it is possible to measure quantitatively the effects produced by a drug in a large population an orderly distribution of variation in response is revealed. If this is the case, then the laws of probability indicate that if very large populations are studied occasional individuals will show very wide deviations from the mean response. These exceptional individuals are undoubtedly a nuisance from the clinical standpoint, but their existence must be recognized.

I feel that an apology is needed for the incomplete and inconclusive nature of the evidence collected in this paper. The examples chosen were the best I could find, and the result is evidence of the urgent need for fuller information regarding the distribution of human variation in response to drugs.

REFERENCES

Alstead, S. (1936). *Post.-grad. med. J.*, **12**, 161.
Bauer, H. (1933). *Arch. exp. Path. Pharmak.*, **172**, 699.
Bogen, E. (1927). *J. Amer. med. Ass.*, **89**, 1508.
Flörcken, H., and Mues, O. (1928). *Münch. med. Wschr.*, **75**, 596.
Gaddum, J. H. (1933). Med. Res. Council, Spec. Report Series, No. 183, London.
Gage, J. C. (1933). *Quart. J. Pharm. and Pharmacol.*, **6**, 418.
Lendle, L. (1928). *Arch. exp. Path. Pharmak.*, **132**, 214.
Li, R. C., and van Dyke, H. B. (1936). *Chin. J. Physiol.* **10**, 407.
Lyon, D. Murray, and Gilchrist, A. R. (1927). *Edinb. med. J.*, **34** 594.
McNelis, P. J. (1936). *Anesth. and Analges.*, **15**, 199.
Paxson, N. F. (1932). Ibid., **11**, 116.
Poe, C. F., Suchy, J. F., and Witt, N. F. (1936). *J. Pharmacol.*, Baltimore, **58**, 239.
Shipway, Sir F. E. (1936). *Canad. med. Ass. J.*, **34**, 2.
Swanson, E. E., and Page, I. H. (1927). *J. Pharmacol.*, Baltimore, **31**, 1.
—— and Shonle, H. A. (1931). *J. Lab. clin. Med.*, **16**, 1056.
Tunger, H. (1931). *Arch. exp. Path. Pharmak.*, **160**, 74.
Widmark, E. M. P. (1932). *Die theoretischen Grundlagen und die praktische Verwendbarkeit der gerichtlich-medizinscher Alkoholbestimmung*, Berlin.
Wien, R. (1936). *Quart. J. Pharm. and Pharmacol.*, **9**, 268

The Hon. Edward Cadogan, deputy chairman of the National Advisory Council set up by the Government to assist in the "National Fitness" scheme, gave an address recently at Harrogate in which he discussed the question of grants for projects of physical training and recreation. He said that when some local body was in need of funds for building a club, gymnasium, or swimming pool, or to lay out a recreation ground, its proposals would go before an area committee, which, after examination, would pass them on with comments to the Central Grants Committee in London. Grants would not be given to central organizations for distribution, but would be made directly in aid of particular local projects put forward by the voluntary organizations and by local authorities. In the Government's efforts to make a healthier and a fitter nation the element of compulsion would be entirely lacking. Mr. Cadogan ended with a tribute to local authorities and voluntary organizations for having done so much with meagre resources to supply the needs of those over school age; but the demand for means for physical training and recreation now far exceeded the supply.

FOOD REQUIREMENTS AND FOOD INTAKES*

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In quantitative work of any kind it is most important always to distinguish clearly between what is actually being measured and the deductions that are being made therefrom. This statement applies to the study of human food requirements and intakes just as much as it does to any other scientific investigation involving measurement, and the purpose of this article is to examine some of the assumptions and deductions commonly made in such work.

Food Requirements

As applied to food or food constituents the term requirement is used in several rather different senses. To most people the unqualified term "requirement" seems to mean the amount of any food constituent which will maintain an individual or a group of individuals in the *status quo ante* over a prolonged period of time. The term is used very loosely because the *status quo*, which is usually average health, is often presumed to be a state of perfect health, but in the absence of any tests must often not be so. This use of the term "requirement" is to be discouraged. The term "minimum requirement" permits of more precise definition, and may be stated for adults to be the least amount of any dietary constituent necessary to maintain a perfectly healthy individual in equilibrium for a given (usually a short) period of time. For children a separate definition is required. Here the minimum requirement is the least amount of any dietary constituent which will support an optimal rate of storage in the growing body.

The minimum requirements of many food constituents can be directly determined both in animals and man. The determination always involves some experimental departure from natural conditions, and the actual method varies with the particular food constituent to be investigated. Thus the determination of calorie requirements may involve a totally different approach and technique from the determination of the various mineral requirements. "Optimum requirements" for both adults and children are of far greater practical importance than minimum requirements, but they are exceedingly difficult to assess. They always exceed the minimum requirements by an allowance for foreseen and unforeseen eventualities. This allowance cannot be experimentally determined. In its assessment many independent lines of evidence may have to be considered, and the final decision is always a matter of judgement and will vary with the investigator. Everyone is agreed, however, that the requirements of different food constituents vary with age, sex, and occupation, and do not necessarily all vary in the same direction. Thus the calorie requirement rises with age up to puberty and thereafter varies with the amount of physical work performed. The calcium requirement, on the other hand, is certainly greater in childhood and adolescence than it is after growth has ceased, and is possibly greatest of all during pregnancy and lactation. Women's iron requirements are probably greater than men's throughout the whole of the child-bearing epoch. Vitamin requirements are admittedly greater during childhood than they are in later life, and, as with calcium, pregnant and nursing women rank with children in this respect.

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Food Intakes

Food intakes are usually measured with a view to determining the chemical composition of the diet, although in some cases the kinds and amounts of the actual foods eaten are of primary importance. The determination of food intakes might appear at first sight a relatively simple matter, and so indeed it is, but even here assumptions are usually made. These can be reduced to a minimum if individual diets are weighed, and duplicate portions of all food and drinks are set aside and analysed by reliable chemical methods. In practice this is only possible if relatively few persons are studied. If individual diets are weighed and the composition calculated from food tables it is assumed that the composition of the foods eaten is the same as that of the foods analysed. This is certainly not the case, since the composition of different samples of the same food may vary widely. Experiments have shown, however, that the error introduced under favourable conditions is not a large one. Individual food intakes, therefore, can be assessed with a high degree of accuracy and the result regarded with a corresponding measure of confidence. They are not, however, synonymous with individual requirements and should never be so regarded, although they may be used, but only in special circumstances and with special precautions, as a guide to optimum and even minimum requirements.

In dietary investigations individual intakes have been little studied, and the usual procedure has been to determine the food intake of a group of persons. The accuracy with which this can be done varies with the group to be studied and the method to be employed, but, speaking generally, it can be done with an accuracy little, if at all, inferior to that attending the determination of individual intakes. If the experiment is performed on a group of persons of the same age and sex the average intake for that age and sex can readily be obtained. It is perfectly justifiable to average in this way, although, if one does, the value of the results is limited by the fact that the individual variations—which are of the greatest importance in medicine—remain quite unknown. The moment a less homogeneous group is selected for study difficulties begin to arise, not in the measurement of the food consumption of the group, but in the handling and interpretation of the data. Let us suppose that the group selected for study is a boys' school where the ages vary from 8 to 12. The results obtained expressed as averages on a per capita basis have considerably less significance than those obtained from the homogeneous group discussed above, because it is known that the intakes of boys of 8 are less than those of boys of 12. In most practical nutritional studies the difficulties are very much greater, for the unit or group commonly selected for study is the family, consisting generally of an adult of each sex and a variable number of children of different ages. To average family food intakes on a per capita basis is obviously of little scientific value. The following device was accordingly introduced many years ago and has been employed ever since.

Arbitrary scales for the food requirements of adults and of children of all ages and both sexes have been drawn up by various workers. The requirements of the family studied are worked out from one or other of these scales,

and the sum of the individual requirements may then be compared with the family intake actually obtained. More usually the scale of requirements may be used to reduce the family intake to a unit value—the so-called "man value" basis. By these means one family may be compared with another and the manipulation of the results generally is greatly facilitated. Now let us consider the shortcomings of this method.

1. Many assumptions have to be made, even in the collection of the data. If any members of the family take meals away from home the amount consumed by them is a matter of guesswork. The same applies if visitors are entertained during the period of investigation.

2. At best the "family" method gives only average results. Individuals within the group may not behave in the predicted manner, and the results obtained therefore have little or no individual significance. To cite a particular instance, if a mother were to starve herself to death for the sake of the other members of the family, the result would merely be a somewhat subnormal intake for the family on the "man value" basis.

3. The use of a scale of requirements to reduce an accurately measured group intake to a unit value is fraught with danger. Requirements are always a matter of judgement, and every investigator either selects one of the thirty-eight scales of requirements already proposed or introduces yet another more in keeping with his own ideas. When, therefore, the same family intake is reduced to a unit value basis, the results shown may vary by 30 per cent., according to the reducing scale adopted.

4. The scales of requirements in current use are scales of calorie requirements. Everything that we know about requirements indicates that a different scale of requirements should be used for each food constituent investigated. It is in fact a serious mistake to apply a scale of calorie requirements to evaluate intakes of calcium—or iron—or indeed of anything other than calories. This mistake, however, is still frequently made (Cathcart and Murray, 1936; Newcastle, 1936). It is no excuse to plead that requirement scales for calcium or iron are not in existence. Better far to give no results for these ions than to give results which are incorrect and misleading. Actually, scales have been drawn up on these lines, and that suggested by Stiebeling and Ward (1933) is probably the best in existence at the present time.

Conclusions

The food intake of a family may be ascertained with considerable accuracy, but the result has little meaning, and the reduction of this result to a unit value basis gives at best an average without individual variations and is achieved only by making some very daring and wholly unwarranted assumptions. Obviously the family method can never be used to assess requirements, since an arbitrary scale of requirements is invariably used in manipulating the results.

It is difficult indeed to understand why the family method of investigation has had such a vogue, but this point lies quite outside the scope of the present critique. The question is rather whether it should ever be used again. If no other method of studying food intakes were available there would of course be no question, but it is difficult to see what advantages, if any, the family method has over the individual method. Any result obtained by the former technique can be obtained with greater accuracy and without assumptions by the latter. The individual method of study is not difficult, and we would urge those desirous of making nutritional investigations to give it a trial rather than to follow slavishly a method the results of which are so very difficult to interpret.

REFERENCES

Cathcart, E. P., and Murray, A. M. T. (1936). A Dietary Survey in Terms of the Actual Foodstuffs Consumed. M.R.C. Spec. Rep. Ser., No. 218.

City and County of Newcastle-on-Tyne (1936). A Study of the Diets of Sixty-nine Working-class Families in Newcastle-upon-Tyne.

Stiebeling, H. K., and Ward, M. M. (1933). U.S. Dept. Agriculture Circ., No. 296.

THE TREATMENT OF NON-STENOSING PEPTIC ULCER*

BY

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This discussion has been limited advisedly to the treatment of non-stenosing peptic ulcer, because where stenosis has established a mechanical obstruction there can be no difference of opinion as to the appropriate treatment. Mechanical obstruction demands surgical relief.

In the treatment of non-stenosing ulcers there has been a movement during the past decade, in practice rather than in opinion, towards conservative measures. The best surgical opinion has always upheld a sane conservatism. It was a favourite *obiter dictum* of Lord Moynihan's that he never operated on a case of duodenal ulcer until it had been cured nine times by a physician. But there is no doubt that some years ago there were numerous surgeons who regarded all chronic peptic ulcers as suitable grist for their mill, though, being what are known as "practical surgeons," they were not given to airing their views in the medical literature. The swing of medical opinion that has effectually prevented this wholesale and indiscriminate operating upon non-stenosing ulcers is, it will be agreed, a good thing. But in a discussion such as this we should not be influenced greatly by the vogue of the moment, but should seek to inform medical opinion on the more controversial points of treatment, and to lay down clear and precise indications as to the place of surgery in this field.

The change in practice to which I have alluded has been brought about partly by the unfortunate results of indiscriminate surgery, but chiefly by improved medical technique. The almost universal use of fractional gastric analysis has provided a much better guide to treatment than to diagnosis. Far more attention has been devoted to diet, and it has been widely realized that diet is more important than alkalis in the continuous neutralization of hyperchlorhydria which is the aim of medical treatment. There is also a praiseworthy tendency in many quarters to test the results of medical treatment by repeated radiological studies, though, as we shall see later, there are dangers in placing too much reliance on the picture of an ulcer crater.

These advances in medical technique compel our admiration and approval. A less admirable development of recent years has been the widespread use by patients of the various proprietary alkaline powders and medicines, often in large doses over a prolonged period and often with serious toxic results. On the recent vogue of treatment by histidine injections I will merely say that in my

* Read in opening a discussion in the Section of Surgery at the Annual Meeting of the British Medical Association, Belfast, 1937.

judgement it has no convincing scientific foundation save that of psychotherapy, and venture to predict that it will soon have its day and cease to be.

Duodenal Ulcer

The proper treatment of non-stenosing duodenal ulcer is medical. Few, I imagine, will dispute this statement, or deny that if the medical treatment is thorough, including an adequate period of rest in bed at the start and the most punctilious regulation of diet and manner of life in the later stages, the results will usually be good. But cases are not uncommon in which medical treatment fails because the patient is unable or unwilling to carry out instructions as to diet, or for various other reasons. When medical treatment has repeatedly failed or is for social reasons impracticable, ought we to refuse the patient the benefit of surgery until, after years of suffering, he can provide evidence of pyloric stenosis? Some would answer "Yes," but I would not count myself as one of these pessimists.

Another indication for surgery in duodenal ulcer is the occurrence of severe haemorrhage, in one or more attacks. I do not now advocate operation during or immediately after a grave haemorrhage, for I believe the risks are too great. But a serious haemorrhage is very prone to recur, and our aim should be to prevent the chance of a recurrence if we can do it with reasonable safety. The grave emergency can generally be tided over by blood transfusion, and then, when the pulse rate and volume and haemoglobin percentage show that we can operate with safety, we should not delay longer if the patient is on general grounds a good surgical risk and if we are sure that he has a chronic ulcer. I do not dwell on acute perforation as an indication for surgery, since that is outside the realm of controversy.

The Choice of Operation for Duodenal Ulcer

We have not solved the problem, however, when we have laid down the indications for operation. An equally important question is, What operation should we perform? Where the main indication for operation is the prevention of recurrent haemorrhage I am sure that the right answer is this, that the first essential is to excise the ulcer, and with it the vessel that has been bleeding. Gastro-enterostomy alone is a very ineffective operation for a bleeding duodenal ulcer, and gastro-enterostomy combined with excision of the ulcer is both difficult and dangerous. The most effective method of excising the ulcer is to include the first part of the duodenum in some form of gastrectomy. This both controls the source of the bleeding and averts the danger of a recurrence. But where the ulcer is a penetrating one on the posterior wall of the duodenum with great surrounding fibrosis its excision may involve too much danger. In such cases it may be more prudent to leave the ulcer alone, divide the pre-pyloric portion of the stomach some two inches above the pyloric sphincter, and do a high Polya gastrectomy. The ulcer will be left in a cul-de-sac of duodenum removed from contact with acid gastric juice, and may be relied upon to heal without delay.

We must now consider the choice of operation for simple non-stenosing duodenal ulcers with no history of haemorrhage. It is comparatively rarely that we are called upon to operate on such cases, but in recent years opinion has been more divided as to the best operation to perform in this condition than upon any question in gastric surgery. We may, I think, exclude from our consideration such operations as gastro-duodenostomy in its various forms, which have never achieved great popularity among surgeons in these islands, and other "fancy operations," and limit our attention to the question of posterior gastro-enterostomy versus gastrectomy. Posterior gastro-enterostomy is an operation with a very low mortality—not more than 2 per cent. in competent hands—and the vicious-circle vomiting so often met with twenty years ago has been eliminated by modern technique; but over it hangs the dread of gastro-jejunal ulcer, and gastro-jejunal ulcer is a far worse calamity than the duodenal ulcer to which it may succeed. What is the risk of this calamity after a posterior gastro-enterostomy? The most careful and comprehensive inquiry into this problem was the collective investigation carried out for the Fellows of the Association of Surgeons of Great Britain and Ireland by Garnett Wright and published in 1935. In a series of 1,730 cases of duodenal ulcer treated by posterior gastro-enterostomy he found an incidence of gastro-jejunal ulcer amounting to 8.49 per cent. But there are certain difficulties in accepting this figure as the whole truth. No fewer than 1,004 other cases were untraced, and it is a matter of speculation whether that large number contained a higher or a lower incidence of gastro-jejunal ulcers than the cases that were traced. My own opinion, for what it is worth, is that the incidence would be somewhat higher. Then there was a series of 507 gastric ulcers in this investigation with the surprisingly high incidence of 10.45 per cent. of gastro-jejunal ulcers. This is surprising, for the reason that operations for gastric ulcer are in the experience of most surgeons far less likely to be followed by gastro-jejunal ulcer than are operations for duodenal ulcer. Garnett Wright very justly ascribed this anomaly to the inclusion in this gastric group of many "pyloric ulcers" that should more properly have been described as duodenal. A correction of this classification, had it been possible, would have swollen still further the incidence of gastro-jejunal ulcer. I think it is not unfair to conclude that if we take the work of surgeons of repute all over the country we may consider that posterior gastro-enterostomy for duodenal ulcer is followed by gastro-jejunal ulcer in about 10 per cent. of cases. I do not forget that Sir James Walton (1934), in a personal series of 893 duodenal ulcers, all of which were traced, found only 3.24 per cent. of gastro-jejunal ulcers; but that is gastric surgery at its best, and I suggest the figure of 10 per cent. for gastric surgery of good average quality. Some may estimate the incidence as even higher.

This conclusion is a grave indictment against the operation of posterior gastro-enterostomy for the non-stenosing duodenal ulcer, and this is the reason why many surgeons in this country, and I think more surgeons on the Continent, are abandoning gastro-enterostomy except where stenosis is present. There is good evidence for the belief that gastrectomy, by permanently lowering the secretion of hydrochloric acid, involves a much lower risk of anastomotic ulcer later, but it is a more difficult operation, with a higher mortality, and is certainly no operation for the occasional surgeon.

What is the operative mortality of gastrectomy for duodenal ulcer? It is higher, I believe, than that of the same operation when performed for gastric ulcer, because of the greater technical difficulties, and it may be estimated as somewhere in the region of 6 per cent. But it is essentially capable of reduction in competent and experienced hands, though it is too much to hope that gastrectomy for duodenal ulcer will ever carry as low an operative mortality as gastro-enterostomy.

The conclusion I submit is the following. Where the gastric analysis shows a high hydrochloric acid curve, as it commonly does in young men with duodenal ulcer, the

risk of gastro-jejunal ulcer later is so grave that we should do a high gastrectomy, preferably of the Polya type. In duodenal ulcer in women the risk of recurrent ulcer is much less, and here, if the test meal shows a low acid curve, gastro-enterostomy is a very satisfactory operation. In elderly patients who are poor risks by reason of cardiac or pulmonary degeneration there is also less danger of recurrent ulcer, and where some operative measure is inevitable the less severe operation of gastro-enterostomy should be performed.

Gastric Ulcer

Although gastric ulcers share with duodenal ulcers a common, and largely uncertain, aetiology, their surgical treatment presents very different problems. As we have seen, our treatment of a duodenal ulcer is conditioned by the fear of a more or less remote gastro-jejunal ulcer. Operations for gastric ulcers, however, because of the much lower gastric acidity, are very rarely followed by anastomotic ulcers. But gastric ulcers carry their own special nightmare—the dread of carcinoma. Carcinoma in the first part of the duodenum is so rare that it may almost be said not to occur there, nor does a cancer of the pyloric end of the stomach ever spread into the duodenum. But the stomach is the commonest site of cancer in the body.

The Relation of Gastric Ulcer to Cancer

The danger of cancer supervening on a chronic gastric ulcer has been greatly exaggerated in many quarters. It is a long time since Wilson and MacCarty (1909) of the Mayo Clinic startled the medical world by the statement that 68 per cent. of all gastric ulcers removed at operation showed microscopical evidence of malignancy, and that 71 per cent. of all gastric carcinoma showed pathological evidence of a preceding simple ulcer. It has been proved by many succeeding investigators, approaching the problem from both the pathological and the clinical aspects, that the incidence of the so-called ulcer-cancer is far smaller than Wilson and MacCarty claimed. The site of election of gastric ulcers, which are mostly on the lesser curvature, differs in a striking way from that of cancer, which occurs most commonly near the pylorus, and Stewart's investigations on this point are visualized on the accompanying diagrams (Figs. 1 and 2). Stewart (1931), in a series of 277

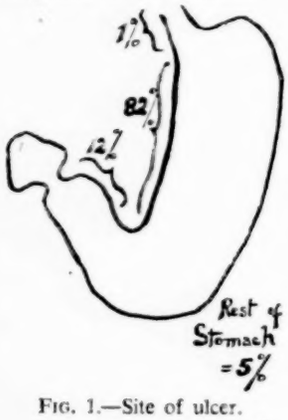

FIG. 1.—Site of ulcer.

FIG. 2.—Site of carcinoma.

chronic ulcers removed by operation, found evidence of early carcinoma in 6.1 per cent. Newcomb (1932), in another careful pathological investigation, showed that 3.5 per cent. of gastric ulcers showed an early malignant change. My own opinion, based upon both histological and clinical evidence, is that malignant transformation of a simple gastric ulcer is a very rare event. In a series of fifty-four cases of proved cancer of the stomach I found (1923) that the average duration of gastric symptoms before examination was 12.7 *months*, whereas in forty-five cases of proved simple chronic ulcer the average duration of symptoms was 10.3 *years*.

It is not, I would suggest, the frequency with which they become malignant that should influence our attitude to the treatment of gastric ulcers so much as the difficulty in many cases of arriving at an accurate diagnosis between simple and malignant ulcers. There is a type of slow-growing cancer of the stomach, by no means uncommon, which very closely simulates the clinical picture of gastric ulcer. In these cases the pain is at first periodic in character, and is relieved both by food and by alkalis. Appetite is often retained, and the gastric analysis in the early stages shows a high or normal acidity. The growth may be regarded as a simple ulcer for a year or two, and yet is a carcinoma from the beginning. The radiological appearance may be either doubtful or suggestive of simple ulcer.

In view of the rarity of simple ulcers and the frequency of carcinomata in the pyloric region lesions in that position that appear to be simple ulcers should always be regarded with suspicion. It is a sound rule that where a pre-pyloric ulcer has been treated medically for three weeks, and there is still occult blood in the stools, gastrectomy should be performed. Whenever a patient of cancer age presents a considerable ulcer crater in any part of the stomach with a short history of gastric pain a suspicion of malignancy should be entertained, no matter how innocent the radiological appearance may be. The following case illustrates this point dramatically.

A lady aged 60 consulted her doctor complaining of vague epigastric pain of a few weeks' duration and some loss of weight. She had never suffered from indigestion before. A radiograph showed a penetrating ulcer in the middle of the lesser curvature that was regarded as simple. Medical treatment was advised. Six weeks later she was rather better, and had put on a few pounds in weight. A second radiograph now showed that the ulcer crater was nearly filled up. After a further three months she was again losing weight and feeling rather more discomfort, in spite of medical treatment. A third radiograph taken less than six months from the onset of symptoms showed a definite carcinoma at the site of the original ulcer crater. I explored the abdomen and found widespread secondary deposits in the peritoneum, and was unable to do anything. It is certain, I think, in spite of the earlier *x*-ray appearance, that this was a carcinoma from the beginning.

Such a case teaches us most eloquently that in gastric surgery clinical history may be more reliable than radiological signs.

Whether the wider use of the flexible gastroscope will prove of great value in this difficult matter of distinguishing simple from malignant ulcers I do not know. When I think of the number of cases I have seen in which the innocent naked-eye appearance of the specimen after resection has been falsified by the microscopical evidence of malignancy, I am doubtful.

Quite apart from the urge that the fear of cancer gives us to radical measures for gastric ulcers, the results of surgical treatment of ulcers in this field are more favourable than in the non-stenosing duodenal ulcers. This is mainly attributable to the fact that in gastric ulcers we find a much lower average acidity than occurs with duodenal ulcers, and consequently there is comparatively little danger of recurrent or anastomotic ulceration. Medical treatment, on the other hand, especially in the larger ulcers, is often followed by relapse after relapse.

Choice of Operation in Gastric Ulcer

It will be agreed by most surgeons that simple gastro-enterostomy is not a satisfactory operation for gastric ulcer. Although it will produce brilliant results in a proportion of cases it is too often followed by recurrence. And any operation that fails to excise the ulcer gives no safeguard against the development of a cancer if the diagnosis should be mistaken. Gastro-enterostomy is not enough. Simple excision of the ulcer also stands condemned because it leaves unaltered the physiological conditions that led to the formation of an ulcer, and is followed in a large proportion of cases, as we might expect, by recurrence. Excision of the ulcer combined with gastro-enterostomy is a much more satisfactory operation, but its results are in no respect better than those of partial gastrectomy, and it is often a much more difficult operation to perform. For this reason I now find myself doing it very rarely.

The operation of choice for any accessible chronic ulcer in the stomach is undoubtedly some form of partial gastrectomy. On this main question there is very general unanimity among surgeons. It is only when we come to discuss the precise method of performing the gastrectomy that differences of opinion appear. This is not the place to discuss the minutiae of surgical technique, but the choice lies between some form of Billroth I operation in which the stump of the stomach remaining is anastomosed with the first part of the duodenum, or some variety of the Polya gastrectomy (including Finsterer's operation) in which the stomach is united to the side of the first jejunal loop. There is perhaps no very fundamental principle involved, and every surgeon will tend to get the best results with the type of operation in which constant practice has steadily improved his technique. My own preference is decidedly in favour of that modification of the Billroth I operation associated with the name of Schoemaker. It has the advantages that it is simple to perform, it is less destructive of gastric function than the Polya operation, and it is therefore less liable to be followed by a severe degree of achlorhydric anaemia. I repeat that each surgeon will be guided chiefly by his practical experience. My own experience is that the Schoemaker gastrectomy is the safer operation. For gastric ulcer I have performed the Polya operation only forty-seven times with three deaths, a mortality of 6.4 per cent., while I have performed the Schoemaker operation 171 times with five deaths, a mortality of 2.9 per cent.

I submit that a method of gastrectomy involving a mortality of less than 3 per cent. is getting near to the ideal that it should be as safe as gastro-enterostomy. The convalescence is always smooth and uneventful, and the late results are good in a very high proportion of cases. I have a record of only one anastomotic ulcer following the Schoemaker operation in my own series. For the large ulcers extending high up on the lesser curvature I find this operation rather more feasible than the Polya, because one is not compelled to use the fibrosed lesser curvature adjacent to the ulcer in making the anastomosis.

Treatment of Gastro-jejunal Ulcer

There is no comparison between the ease of operating on a gastric or duodenal ulcer that is, so to speak, virgin soil for the surgeon and the difficulty of an operation for an anastomotic ulcer. To undo the gastro-enterostomy, excise the ulcer, and restore the stomach and jejunum to their original state is often a long and arduous undertaking, so that a surgeon who has accomplished it is tempted to be content and to close the abdomen. But if he does the original duodenal ulcer may usually be relied upon to re-form, and if later another gastro-enterostomy should be undertaken for its relief the gastro-jejunal ulcer will almost inevitably recur.

There is only one satisfactory operation for a gastro-jejunal ulcer that resists all medical treatment, as a good many of them do, and that is to undo the gastro-enterostomy and then to proceed to perform a high Polya gastrectomy. Only by abolishing the gastric function and removing the oxyntic cells as completely as possible can the vicious circle be broken. There is no more formidable operation in the surgery of the stomach, particularly where a gastro-colic fistula has to be closed in addition. The mortality is a very considerable one, but for those patients who come safely through the operation the prospects of a permanent cure are extremely good.

REFERENCES

Morley, J. (1923). *Lancet*, **2**, 823.
Newcomb, W. D. (1932). *Brit. J. Surg.*, **20**, 279.
Stewart, M. J. (1931). *Lancet*, **2**, 565.
Walton, A. J. (1934–5). *Brit. J. Surg.*, **22**, 33.
Wilson, L. B., and MacCarty, W. C. (1909). *Amer. J. med. Sci.*, **138**, 846.
Wright, Garnett (1934–5). *Brit. J. Surg.*, **22**, 433.

THE VALUE OF PATERNITY EXCLUSIONS MADE BY THE BLOOD-GROUPING TEST

BY

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With the increasing demand for the introduction of legislation in this country to allow of the use of the blood-grouping test in all paternity cases it is desirable to examine the test in greater detail to see exactly what it will do. It is unnecessary to discuss in detail the method of inheritance of the blood groups, as this has recently been done by other authors (Harley and Roche Lynch, 1937, 1937a), but it may conveniently be summarized in four laws, two relating to the ABO system and two to the MN system. The heredity of the ABO system is dependent upon three allelomorphic genes, A, B, and O, of which A and B are dominant over the recessive O. The MN system is inherited by two genes, M and N, each of equal dominance. Thus we have the four main blood groups, A, B, AB, and O, each of which may be further subdivided by the independent MN system into M, N, or MN.

The Laws of Inheritance

The laws of inheritance which have been formulated from the investigation of many thousands of families are:

ABO.—(1) The factors A and B cannot appear in the blood of a child unless they are present in the blood of one or both parents. (2) The combinations AB parent and O child, and vice versa, are incompatible with the laws of heredity of the group factors.

MN.—(1) The factors M and N cannot appear in the blood of a child unless they are present in the blood of one or both of the parents. (2) The combinations M parent and N child, and vice versa, are incompatible with the laws of heredity of the group factors.

The groups A and AB may be further subdivided into A_1 and A_2 and A_1B and A_2B by the use of appropriately absorbed group B or normal animal sera. This observation was first made by von Dungern and Hirsch-

feld in 1911, and from it has arisen the accurate subgrouping of the factor A; A_1 being the "strong" A and A_2 the "weak" A. Recently Friedenreich (1936) has demonstrated the existence of a still weaker type of A receptor, which he calls A_3. All these factors are inherited according to simple Mendelian laws, A_1 being dominant over A_2, which in turn is dominant over A_3. I propose to ignore the A_3 group, as the factor is extremely rare and very few families have so far been investigated. However, with the introduction of the A_1–A_2 system into paternity cases we have a greatly increased probability of exclusion based upon four further laws:

A_1–A_2.—(1) The agglutinogen A_1 cannot appear in the blood of a child unless it is present in the blood of one or both parents. (2) The combinations A_1B parent and A_2 child, and vice versa, are incompatible with the laws of heredity of the group factors. (3) In the special matings $A_1B \times B$ and $A_1B \times A_1B$, A_2B children cannot result. (4) Where several children are available in each mating further special exclusions are possible with the following five special crosses: $A_1 \times O$, $A_1 \times A_1$, $A_1 \times B$, $A_1 \times A_1B$, and $A_1 \times A_2B$. In these matings, if there is one child belonging to either group O or B none of the remaining children can be of group A_2 or A_2B, and conversely. This is easily understood from a consideration of the genotypes of the parents concerned (Table I).

We are dealing, therefore, with two independent genetic systems (the ABO and A_1–A_2 systems may conveniently be taken together), the genotypes of their various constituent groups being shown in Table I.

TABLE I.—*Composition of the Blood Groups.*

Genotype	Phenotype	Genotype	Phenotype
A_1–A_2 system :		ABO system :	
A_1A_1, A_1A_2, A_1O	A_1	AA, AO	A
A_2A_2, A_2O	A_2		
A_1B	A_1B	AB	AB
A_2B	A_2B	BB, BO	B
		OO	O
MN system :			
M_1M_1 MM	M		
N_1N_2* NN	N		
N_2N_2			
MN_1 MN	MN		
MN_2			

* The N_2 type is discussed under exclusion type 4. No person corresponding to N_2N_2 has yet been demonstrated.

It is upon these laws of inheritance that the possibility of making paternity exclusions is based. There are, however, certain reservations attached to some of the exclusions, and I propose to discuss each of the various types of exclusion in detail, starting with the strongest and going down to the weakest.

Types of Exclusion

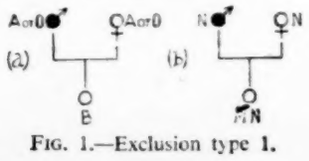


FIG. 1.—Exclusion type 1.

In these two cases the exclusion of the man from paternity is so strong as to be almost absolute. In case 1a we know that the father must possess the B factor, and in case 1b he must possess the M factor, neither of which obtains with the men in question. Both the B and the M factors are extremely stable, and there is no reason to suppose that they are ever suppressed—that is, fail to appear in the phenotype although actually present in the genotype. This exclusion, therefore, is the strongest which is compatible with the accuracy of the test.

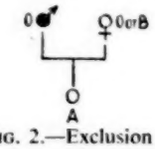


FIG. 2.—Exclusion type 2.

This exclusion, although apparently the same as type 1, is in fact slightly weaker. This will become obvious after discussion of type 3.

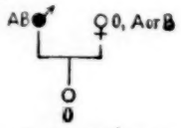


FIG. 3.—Exclusion type 3.

Haselhorst and Lauer (1930, 1931) described a case of an AB mother whose child had persistently remained group O. This is the only proved exception to the ABO system that has been demonstrated, all the other reported exceptions of the same type showing a latent development of the specific factors in the child. In the Haselhorst case, as the child was blind at birth, was markedly deformed, and suffered from a severe anaemia, the anomaly is probably due to a failure in the development of the agglutinogen in the child. The mother was of group A_2B, and in view of the stability of the B factor it is probably the A_2 factor which has not developed—that is, the child is a "latent" or "repressed" A_2, which may later become manifest or may remain hidden throughout his life.

Exclusion type 3 is really a Haselhorst case against the father, and in estimating the value of the exclusion we have to take into account the possibility of a recurrence of the Haselhorst case. Owing to the comparative rarity of group AB, relatively few AB mother–child combinations have been investigated (1,500), whereas 15,000 group O mothers have been examined, none of their children being of group AB. The estimated chance of the failure of a dominant gene in the genotype to develop phenotypically is less than 1 in 10,000, so that, even bearing in mind the possibility of an exception, the value of the exclusion is still very great. It cannot, however, be as absolute as that of exclusion type 1.

Suppose, now, that a person did contain a suppressed A gene which was not apparent in the phenotype. It is possible, if he married, that he might transmit the suppressed gene, which in the next generation might assume its normal dominance and become apparent in the phenotype. Thus it is remotely possible for two group O parents to have a group A child if this eventuality came to pass. Such a case is envisaged in exclusion type 2, in which a group O man is to be excluded as the father of an A child, the mother being either O or B. The chance of such an occurrence is extremely remote, being obviously even less than that of the Haselhorst case, but to be entirely accurate a "formal reservation" in these cases should be made.

It is possible that type 3 of the exclusions may operate against the mother in a paternity case, and if an AB mother is found with an O child in such a case there is a very strong probability that the child is not the natural child of the woman but has been adopted for the purposes of blackmail. Such a case is recorded by Wiener in

New York, where he was able to show that the woman was not the mother; she withdrew her charges against the defendant and the case was stopped (personal communication).

This type of exclusion may be further divided by the A_1–A_2 system:

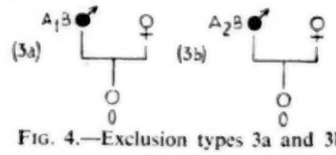


FIG. 4.—Exclusion types 3a and 3b.

The A_1 factor is very much more stable than the A_2 and is more on a par with the B factor in its exclusion power. Thus the exclusion type 3a is almost as strong as type 1, whereas type 3b, in which exclusion has to be made on account of the A_2 factor, is equivalent to the Haselhorst case and requires a definite reservation in assessing its value.

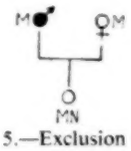


FIG. 5.—Exclusion type 4.

This again appears superficially to be an absolute exclusion, the N factor not being present in either of the parents. Crome (1934), however, described a 19-year-old mother of group OM with an 18-months-old child of group ON, and this apparent exception was confirmed by a number of workers. Thomsen examined the mother with exceptionally strong sera and found that she actually possessed a very weak N receptor as well (analagous to the A_2 factor), and he classified her as OMN_2. The father was an N, so that the child's genotype became NN_2 instead of the MN which was expected. Friedenreich (1936a) has investigated a number of families in which the N_2 receptor is present, and has shown that in fact the MN system is represented by three genes—M, N_1, and N_2—instead of just M and N as was previously supposed. Of these N_1 is dominant over N_2 in the same way as A_1 is dominant over A_2.

In this exclusion type the possibility is that either of the parents may be MN_2, the N_2 receptor being suppressed in them but becoming dominant again in the child. There is a second possibility—that the N_2 factor might be missed by the use of too weak test sera. The possibility of suppression of the N_2 factor is the same as that for the suppression of the A_2 factor, and requires only a formal reservation in interpreting the value of the exclusion. The possibility of an error in technique outweighs the possible error in genetic transmission. It is therefore essential that blood-grouping tests, when used for medico-legal purposes, should be entrusted only to competent experts who have the requisite apparatus and sera continually in use under properly controlled conditions (Thomas, 1937).

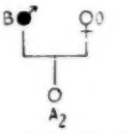


FIG. 6.—Exclusion type 5.

Here again a factor (A_2) is present in the child but is not present in the blood of either the mother or the putative father. The A_2 factor is a weak one and may easily be missed, especially if it is present in conjunction with the more powerful B receptor. As an instance of this I may give my own blood group. As a matter of interest a year ago I was grouped by three persons independently. The first told me I was a group O—his sera were useless, being totally inactive; the second informed me I was a group B—his anti-A serum was of low titre and reacted with A_1 only as far as a dilution of 1 in 2, and with A_2 not at all; the third correctly grouped me as an AB, although even with his potent sera the A reaction was not marked. In fact, the correct group is A_2B, so that there is a very real possibility of error in failing to detect the A_2 in an A_2B blood. Unless this possibility is excluded by the use of properly controlled sera of high titre the value of the exclusion is lost.

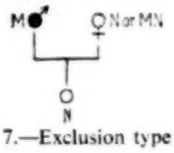


FIG. 7.—Exclusion type 6.

Here, at first sight, the man may be excluded, as his blood contains no N receptor. The exclusion is similar to that of type 4, the same reservation applying to both, the possibility being that the man may be an MN_2, in which case the child could be genotypically N_1N_2. Although it appears exactly similar to type 4 it is in fact a slightly different exclusion. In this case the child is N_1N_2, inheriting an easily demonstrable factor from the mother, the possibility of error arising from the failure to demonstrate the weak N_2 in the alleged father. In type 4 the exclusion is obviously stronger, for if the child is MN_2 and one of the parents is MN_2 there is no reason why the N_2 should be demonstrated in the one and not in the other. Thus the possibility of technical error is greater in type 6 than in type 4.

In effect the exclusion made by type 6 is the case which Crome described, and the possibility of error must always be borne in mind. The error, however, is one of technique rather than of heredity, and as such should be guarded against and overcome.

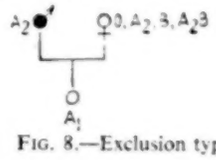


FIG. 8.—Exclusion type 7.

This is an immediate exception to the laws of inheritance of the A_1–A_2 system, in that A_1 is not present in either the mother or the alleged father. The reservation which must be made in these cases is again one of the possibility of error in technique, and unless the criteria of proper technique are satisfied and *completely typical* reactions obtained the exclusion cannot stand.

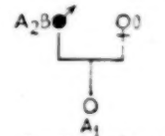


FIG. 9.—Exclusion type 8.

No importance should be attached to this exclusion type owing to the possibility of technical error at the present time.

Considerations in Evaluation

In general the following considerations apply in the evaluation of paternity exclusions by the blood-grouping test.

ABO System

By far the most complete investigations of the heredity of the blood groups have been made with the ABO system, and out of the many tens of thousands of families examined only one exception to the accepted laws of transmission of the group factors has been demonstrated (the Haselhorst case). The possibility of the recurrence of such a case is so slight that *paternity incompatible with the ABO system must be excluded with as great a degree of certainty as a biological method can give.* It is justifiable to leave the Haselhorst case out of consideration unless there are quite exceptional circumstances, apart from the blood-grouping test, which indicate that the paternity is established.

TABLE II.—*Paternal Exclusions by the ABO and A_1–A_2 Systems*

Mother	Child	Father	
		Possible	Impossible
O	O	O, A_1, A_2, B	A_1B, A_2B
O	A_1	A_1, A_1B	O, A_2, B, A_2B
O	A_2	A_1, A_2, A_2B	O, B, A_1B
O	B	B, A_1B, A_2B	O, A_1, A_2
A_1	O	O, A_1, A_2, B	A_1B, A_2B
A_1	A_1	All groups	None
A_1	A_2	O, A_1, A_2, B, A_2B	A_1B
A_1	B	B, A_1B, A_2B	O, A_1, A_2
A_1	A_1B	B, A_1B, A_2B	O, A_1, A_2
A_1	A_2B	B, A_1B, A_2B	O, A_1, A_2
A_2	O	O, A_1, A_2, B	A_1B, A_2B
A_2	A_1	A_1, A_1B	O, A_2, B, A_2B
A_2	A_2	O, A_1, A_2, B, A_2B	A_1B
A_2	B	B, A_1B, A_2B	O, A_1, A_2
A_2	A_2B	B, A_1B, A_2B	O, A_1, A_2
B	O	O, A_1, A_2, B	A_1B, A_2B
B	A_1	A_1, A_1B	O, A_2, B, A_2B
B	A_2	A_1, A_2, A_2B	O, B, A_1B
B	B	All groups	None
B	A_1B	A_1, A_1B	O, A_2, B, A_2B
B	A_2B	A_1, A_2, A_2B	O, B, A_1B
A_1B	A_1	All groups	None
A_1B	B	All groups	None
A_1B	A_1B	A_1, B, A_1B, A_2B	O, A_2
A_1B	A_2B	A_1, A_2, A_2B	O, B, A_1B
A_2B	A_1	A_1, A_1B	O, A_2, B, A_2B
A_2B	A_2	O, A_1, A_2, B, A_2B	A_1B
A_2B	B	All groups	None
A_2B	A_1B	A_1, A_1B	O, A_2, B, A_2B
A_2B	A_2B	A_1, A_2, B, A_1B, A_2B	O

A_1–A_2 SYSTEM

Here the available family material is considerably smaller than that of the other two systems, but there can be no doubt as to the correctness of the genetic hypothesis which has been advanced. In a few persons the red cells give atypical reactions so that they cannot be classified sharply into either group A_1 or A_2, and no conclusions ought to be drawn from them by the A_1–A_2 exclusion system. When, however, the group reactions are quite typical the possibility of a man being the father in fact when he has been excluded by the A_1–A_2 system is exceedingly slight. The possibility of A_1 being mistaken for A_2 in rare cases cannot, however, be entirely ruled out, although it is very remote if the examination is properly conducted by agglutination *and* absorption tests, and typical reactions have been obtained. It is not safe at the present time to consider a paternity incompatible with the A_1–A_2 system as excluded with biological certainty; it is, however, justifiable to regard such incompatibility as *strong circumstantial evidence of non-paternity*.

Owing to the possibility of technical error, the diagnosis of group A_2B is less reliable than that of group A_2, although the diagnosis of group A_1B is quite as reliable as that of group A_1. If a paternity is incompatible with the A_1–A_2 system because one of the parties is of group A_2B (while no exclusion could have been made had this person been of group A_1B) *it is not justifiable at present to consider the paternity so improbable that a decisive importance may be attached to the blood grouping in such a case.*

MN SYSTEM

The material available here is already large and is steadily growing. Although the system has been widely investigated for ten years now, it was not until three years ago that the N_2 factor was discovered. This factor is extremely rare, and is characterized by an abnormal but inherited weakness of the N receptor; one has always to consider the possibility that it may escape detection with a resulting erroneous exclusion. This, however, only applies to certain of the parent–child combinations (exclusion types 4 and 6).

The remaining exclusions made by this system are not affected, as paternity would still be incompatible even if there were a concealed N_2 receptor in one of the parties. In these cases a *paternity incompatible with the MN system may be excluded with as great a degree of certainty as a biological method can give.*

List of Paternal Exclusions

All the possible exclusions are given in Tables II and III. Table II showing the combined exclusions by the ABO and A_1–A_2 systems, and Table III those by the MN and N_1–N_2 systems.

TABLE III.—*Paternal Exclusions by the MN and N_1–N_2 Systems.* (After Thomsen, 1936.)

Mother	Child	Father		
		MN System (old)		M–N_1–N_2 (new)
		Possible	Impossible	
M	M	M, MN	N	If the child is MN_2 the father may be NN_2 or possibly N_2N_2. Thus N cannot be excluded with certainty
M	MN	N, MN	M	M still excluded
N	N	N, MN	M	If the child is NN_2 the father may be MN_2, so that M cannot be excluded with certainty
N	MN	M, MN	N	N still excluded
MN	M	M, MN	N	If the child is MN_2 the father may be NN_2 or possibly N_2N_2. Thus N cannot be excluded with certainty
MN	N	N, MN	M	If the child is NN_2 the father may be MN_2, so that M cannot be excluded with certainty
MN	MN	All	None	Theoretically a N_2N_2 father may be excluded. This is of no practical significance
M	N	The mother may be MN_2, and the child may receive its N from the father. Thus all M men are excluded. If the father is MN_2 the child can be N_2N_2		
N	M	The mother may be NN_2, and the child must be MN_2. In this case the father must be M or MN. Thus all N men are excluded		

Summary

1. The value of each type of paternity exclusion has been discussed.

2. In most cases the possibility of error is that of an error in technique rather than a deviation from the genetic laws which govern the heredity of the group factors, and as such should be properly guarded against.

3. The appropriate reservations for each type of exclusion have been discussed.

I am greatly indebted to Professor Dr. Knud Sand and Dr. V. Friedenreich of the Universitets Retsmedicinske Institut, Copenhagen, for their valuable assistance in the preparation of this paper.

REFERENCES

Crome, W. (1934). *Münch. med. Wschr.*, **81**, 1856.
Friedenreich, V. (1936). Ibid., **89**, 409.
—— (1936a). *Dtsch. Z. ges. gerichtl. Med.*, **25**, 358.
Harley, D., and Lynch, G. Roche (1937). *British Medical Journal*, **1**, 163.
—— —— (1937a). *Med.-leg. criminol. Rev.*, **5**, 182.
Haselhorst, G., and Lauer, A. (1930). *Z. Konstitut.*, **15**, 205.
—— —— (1931). Ibid., **16**, 227.
Thomas, J. C. (1937). *Med.-leg. criminol. Rev.*, **5**, 54.
von Dungern and Hirschfeld (1911). *Z. Immun. Forsch.*, **8**, 526.

The German Pathological Society will hold its congress at Frankfurt a.M. under the presidency of Professor H. Beitzke of Graz from September 16 to 18, when the chief subjects for discussion will be allergy, and occupation and cancer. Further information can be obtained from the secretary, Professor G. B. Gruber, Planckstrasse 8, Göttingen.

TECHNIQUE OF CATARACT EXTRACTION DURING NARCOSIS*

BY

BASIL GRAVES

Operations on the interior of the adult eye are performed with the patient awake, particularly in the case of cataract extraction. This is because with the usual operative technique the co-operation of the patient is necessary to supplement the control of the position of the eye, and the congestion, vomiting, and other disturbances commonly associated with general anaesthesia entail risks to the eye. The mental strain on the average elderly person of consciously submitting to a cataract operation is considerably more than is realized. Medical thought is accustomed to the use of local anaesthesia, the patient remaining fully conscious, and to the extreme degree of unconsciousness of general anaesthesia. But attention has not been given to the attainment of a less extreme state of somnolence, in which, besides being given the usual local injection of novocain, the patient may also be put to sleep to a degree sufficient to abolish all consciousness of the proceedings. "Surgical narcosis" might be a suitable name for such an intermediate state.

The purpose of this article is to describe, first, a routine technique—which I have employed for a long time—for rendering the patient quietly unconscious during operations on the interior of the eye. The state of sleep lasts for some seven to fourteen hours after operation—a period in which pain is commonly experienced after the effect of the usual local anaesthetic has disappeared. The patients wake up as from a long normal sleep, with no pain in the eye and seldom with any unpleasant general sensations. Secondly, I propose to describe briefly a modification of the operative technique of cataract extraction, which meets these conditions of narcosis, adds safety to the orthodox method, and has the advantage that the patient can safely be propped up in bed on the next day and can sit out of bed usually on the third day instead of staying in bed for the customary seven days.

Elderly persons, especially women, after cataract operations may experience serious symptoms such as vomiting, flatulence, abdominal pain, and constipation, which are usually attributed to the absence of peristalsis due to lying on the back for many days. Delirium may follow cataract extraction done with the patient awake, as may urinary retention. If patients who have not had cataract operations lie flat for days they do not get the same, if any, distressing symptoms. In my experience these symptoms do not ensue if "surgical narcosis" has been employed, and it can therefore reasonably be suggested that they are connected with "mental shock" consequent on operations done on the eyes of elderly persons while conscious.

Orthodox Technique

The most important point in cataract extraction is that the surgeon should leave the face of the vitreous fluid intact. Even if the patient has reasonably good vision afterwards any loss of vitreous during or after the operation is a grave surgical disaster, due practically always to faulty technique. Prolapse of the iris is the most feared post-operative complication, since it necessitates a further and risky operation on a sensitive eye. The first case of prolapsed iris that I had in private practice was due to delirium coming on the day after extraction of the cataract. The patient in her violence ruptured the face of the vitreous, of which much escaped. This case turned my attention to devising methods of increased safety.

When the incision is made in cataract extraction the eye is usually steadied by fixation forceps which grip the friable conjunctiva either at W (Fig. 1) or at X, or at some point between. In either case the active co-operation of the patient is needed to control the eye and prevent the movement of the knife rolling it sideways if the grip is at W, or rolling it upwards if the grip is at X. Some operators insert a length of silk (R, Fig. 3) in the tendon of the superior rectus; this stabilizes the eye to some extent, but not adequately by itself. In the customary procedure the "puncture" (P, Fig. 1) and counter-puncture (P') are outside the limbus (L). The knife (K, Fig. 1) makes a "peripheral" incision cutting out close to the base of the iris so as to create a conjunctival flap (C, Fig. 2) beneath which the incision eventually heals. The

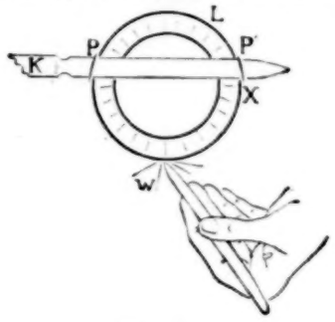


FIG. 1.

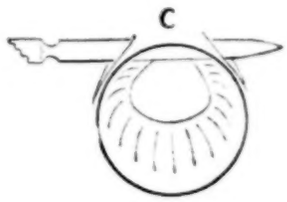


FIG. 2.

peripheral position of the incision predisposes to prolapse of the iris, which is not prevented even if the conjunctiva is sutured, as is occasionally done. I prefer to make the incision mainly on the corneal side of the limbus away from the base of the iris.

Surgical Narcosis

In 1934 I used various recognized agents, including bromide and chloral hydrate and rectal paraldehyde; nembutal causes restlessness in some patients. In 1935, after consultation with Dr. R. J. Clausen, Dr. Maitland Scott, and Mr. L. Broster, I decided that rectal paraldehyde was reasonably satisfactory. Later I combined with this a hypodermic injection of omnopon, and the result was excellent. The amount of paraldehyde given—one drachm being dissolved in ten drachms of saline—is three-quarters to one drachm for each stone of the patient's weight, and the dose of omnopon should be one-thirtieth of a grain for every stone (*vide*:—Section of Anaesthetics of the Royal Society of Medicine: "Preliminary Medication in Anaesthetics," December 7, 1928; also "Premedication," *Journal*, October 17, 1931, p. 693, both by Stanley Rowbotham). Bromide is given by mouth in the preceding twenty-four hours. The paraldehyde is given by the rectum an hour before the operation; the omnopon is injected about half an hour before the operation. About three-quarters of an hour before operation some biniodide of mercury ("cusi") ointment is placed beneath the eyelids. At the same time two small cotton-wool swabs, soaked respectively in 2 per cent. homatropine and adrenaline 1 in 1,000 (to produce full dilatation of the pupil) are inserted beneath the upper eyelid. The swabs and the ointment are renewed a quarter of an hour before operation, with an additional swab soaked in 1 per cent. cocaine. (I omit here the description of certain customary novocain and adrenaline injections of the eyelids, etc., besides nursing details of the preliminary preparation for narcosis, which is simple.) If less paraldehyde and omnopon is given, so that deep narcosis is not attained, then, despite semi-consciousness,

* Received June 8, 1937.

the patients afterwards deny having any memory of the operation.

Many of my cases have been dealt with in the nursing home of Sister E. E. Hughes, and Sister A. Bryant, formerly staff-nurse to the eye department of St. Bartholomew's Hospital. They have been impressed by the absence of post-operative mental and other distress in cases operated on under "surgical narcosis"—an opinion more convincing when expressed by the nursing staff than by a surgeon who visits the patients only briefly.

Modified Technique of Operation

The patient being soundly asleep, the conjunctiva is incised along WX (Fig. 3) and is retracted to GH. The steadying suture, R, is then inserted in the superior rectus tendon. With a "broad needle" (N, Fig. 3) I then pierce a small tunnel, T, in the surface of the "cleaned" sclera. Perforation of the sclera has been done daily for decades in inserting the stitches in operations for squint. This tunnel, instead of being horizontal, may be vertical (T^1, Fig 4), a special broad needle (bent on the flat at K) being used. In the drawings here reproduced the tunnel has been drawn arbitrarily either vertical or horizontal. The relative merits of each cannot be described here; on the whole the vertical (Fig. 4) is preferable.

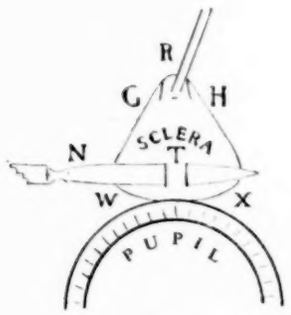
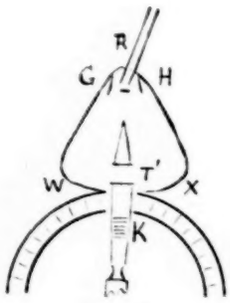


FIG. 3.



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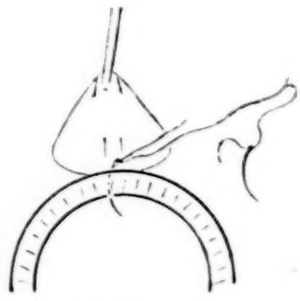
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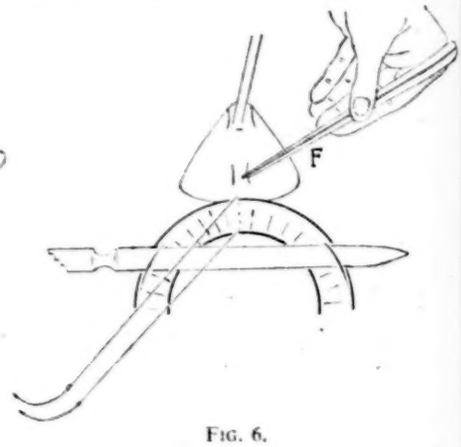

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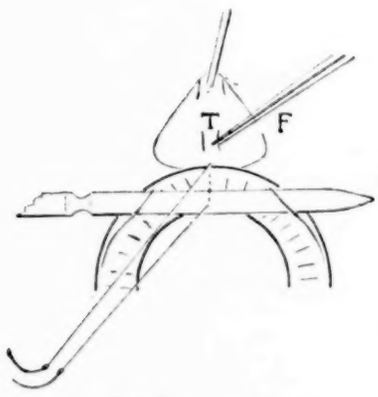

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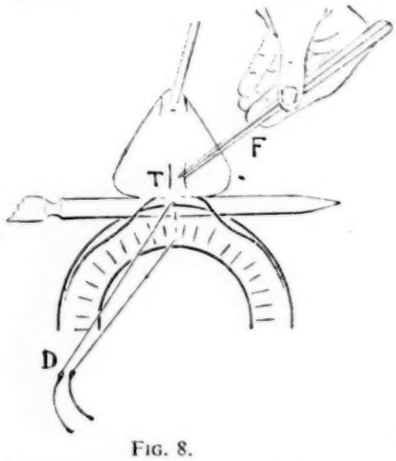

FIG. 8.

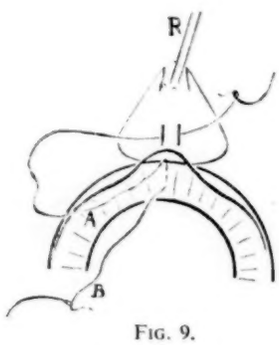

FIG. 9.

FIG. 10.

One of two fine needles (Fig. 5) on a piece of Wiess's finest black silk is then inserted through the middle layers of the cornea without penetrating to the interior of the eye. The precise manner of inserting this corneal suture in relation to the tunnel, T, depends on the way chosen to tie it at the end of the operation. The assistant then holds the steadying superior rectus stitch (R, Fig. 3) with one hand and this fine corneal stitch with the other. In making the incision to open the eye the operator secures an absolute yet most delicately variable control of the eye—from what is mechanically the correct point of application—by gripping the edge of the cover of the tunnel, T, with a pair of fine-pointed forceps (F, Figs. 6, 7, 8).

The knife, which has been dipped in hot vaseline, is passed slowly upwards behind the corneal stitch (Figs. 6, 7, 8) and, after a deliberate pause to select the site, is slowly brought out between this stitch (D, Fig. 7) and the tunnel, T. One end of the corneal suture is then threaded through the tunnel (Fig. 9). Alternatively, the needle (N, Fig. 10) can have been placed in the tunnel before the incision is made, after which it is drawn completely through. (If it is drawn right through before this there is risk of cutting the stitch as the knife emerges.) By pulling on the parts A and B of this thread (Fig. 9) the incised upper part of the cornea is lifted up like the lid of a box, a piece of the lens capsule is removed with capsule forceps, and the cataractous nucleus is tilted forward and upward by the lightest of pressure on the lower part of the cornea and is then picked out on the point of a cystitome.

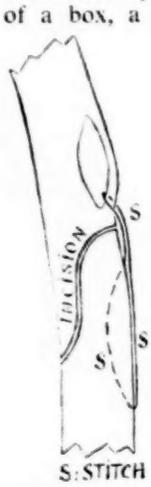

FIG. 11.

The dilated iris is not touched throughout the operation; no iridectomy is needed. The fine suture is then pulled fully through the tunnel and tied, after which it is passed through the conjunctiva and tied again. Fig. 9, in which the conjunctiva is omitted, shows sectionally how the suture does not enter the interior of the eye. Drops of atropine, 1 per cent., and argyrol, 15 per cent., are finally instilled.

The patient sleeps on for seven to fourteen hours and sits up in bed the next day, rested and free from pain, and usually can sit out of bed on the third day instead of the customary seventh. In trephining for glaucoma I put the patient to sleep in a

similar way. The superior rectus stitch gives adequate steadying of the globe in trephining, and abolishes any need of the patient's co-operation.

Conclusion

I have given the procedures mentioned here a long and detailed trial. They will be described more fully in a publication I have in preparation. I think that eventually the custom of patients walking into an operating theatre and consciously co-operating in the performance of an operation on their own eye may come to be regarded as anomalous. Apart from the absence of discomfort and distress in the days following the operation, and the benefit to the patient of being asleep during it, the advantage it affords to the operator is such that I believe no operator who had accustomed himself to the method I have described would care to resume cataract-extraction, or glaucoma-trephining, on patients when they were not thus asleep. Nervous patients can be kept asleep for still longer by the administration of more hypnotics later. The eye is the only transparent part of the surface of the body. After an operation for cataract, expert examination can at any time during the rest of the patient's life provide an accurate estimate of the competence of the technique employed by any operator. It follows that theoretical objections to innovations can always be met with the proposal that all cases be submitted after operation to impartial expert examination.

Clinical Memoranda

Bilateral Spontaneous Pneumothorax

In view of the article by Dr. R. A. Young (1936) in the *British Medical Journal*, and a further communication by Herbert L. Settle (1936), it is hoped that the following case will be of interest. Although I did not see this patient the full notes were passed to me for perusal, and from them the following extract was made.

At Jerusalem Sergeant B, aged 34, a quiet, temperate, and apparently healthy young man, rose from his bed before réveillé on November 11, 1936, and complained to his comrades of a pain "below the chest." He then went for a short walk, and on his return said he felt better. He ate a usual breakfast, but at 8.30 a.m. he went back to the sergeants' mess and ordered a lemonade, which he drank quickly, saying afterwards, "That's better." Later in the morning, while in the orderly room, he suddenly fell face forward to the ground. He was removed to hospital immediately, but on examination was found to be dead. Prior to this catastrophe there had been no undue strain from laughing, coughing, sneezing, shouting orders, or from exercise such as running or mounting stairs. There was no history of injury to the chest wall. At the post-mortem examination both lungs were found to be completely collapsed. The lungs were of normal texture, and there was no macroscopic evidence of tuberculous, neoplastic, or other disease. The pleural surfaces were normal in appearance over the whole of the lungs and chest wall. The pleural cavities contained no exudate. There was no evidence of an opening on the lung surfaces when water from a tap was forced through the main bronchi. The heart was in diastole, with well-developed and normal muscle. In the pericardial cavity there was no excess of fluid and no sign of inflammation. The brain and abdominal viscera appeared healthy and free from tuberculosis. The cause of this sergeant's sudden decease was considered to be due to spontaneous bilateral pneumothorax.

This case appears, therefore, to belong to the class described by Dr. Young in his paper as pneumothorax in the apparently healthy, or pneumothorax simplex.

From the history it is most probable that it was the occurrence of a sudden pneumothorax on one side which caused him to wake up before réveillé complaining of "pain below the chest," by which he meant, presumably, the upper abdomen. Settle's patient, too, complained of pain in the same region. That the soldier did not feel quite comfortable from that time until 8.30 a.m. is evidenced by his return to the sergeants' mess for a drink; and, from what he said, the fizz of the lemonade temporarily eased his discomfort. It is further presumed that somewhat later, when he was in the orderly room, pneumothorax occurred on the other side, thus causing the inevitable and immediately fatal result.

My thanks are due to Colonel G. H. Richard, Deputy Director of Medical Services, British Forces in Egypt, and to Colonel R. W. D. Leslie, O.B.E., late Deputy Director of Medical Services, Palestine, for permission to submit these notes for publication.

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REFERENCES

Settle, Herbert L. (1936). *British Medical Journal*, **2**, 1141.
Young, R. A. (1936). Ibid., **2**, 690.

Case of Herpes Zoster with Facial Paralysis

The association of common facial palsy with herpes zoster of the neck is rare, and is of interest in view of the controversy regarding the causative organism and its mode of transmission in the latter disease.

The patient, a rather anaemic male aged 62, complained on April 8 of pain in the left occipital region, below the ear, and over the sternomastoid area of the left side of the neck. The pain continued for three days, and was described as being like a neuralgia. He had been employed as a night watchman on a road-building scheme, being exposed for hours at a stretch to cold winds. Three days later an erythema appeared on the left side of the neck, and on examination some hours after I found a typical vesicular rash of herpes zoster over the sternomastoid region on the left side, together with some adenitis in the posterior triangle. The cutaneous area affected by the vesicles suggested involvement of the second cervical nerve.

On the following morning I saw him again. He was now tender below the left ramus of the jaw, and complained of his left eye "running." Examination of the face showed evidence of a left-sided common facial palsy with the mouth drawn to the right side, inability to close the left eye, epiphora, and escape of fluid after drinking from the left corner of the mouth. No other cranial nerve was found to be affected. His temperature was 99.2° F., and pulse 88. With warmth and rest in bed the facial palsy soon improved, and, with the herpes, had disappeared in a fortnight.

The organism responsible for herpes zoster is a filterable virus, the infection passing outwards along the sensory nerve from the corresponding posterior root ganglion. Degenerative changes may spread upwards into the posterior columns of the cord and downwards along the peripheral nerves. On rare occasions the infection has spread horizontally in the spinal cord from the posterior to the anterior horn, resulting in a motor paralysis. The temporary paralysis of the seventh cranial nerve may be explained in this way, the only other solution occurring to me being that the two simultaneous conditions of palsy and herpes were separate entities, the cold winds acting as a common exciting factor.

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Penistone.

BIBLIOGRAPHY

Roxburgh, A. C. (1936). *Common Skin Diseases*, London, p. 177.
Stern, E. S. (1937). *Brit. J. Derm. Syph.*, **49**, 263.

Reviews

ENDOCRINOLOGY

The Endocrines in Theory and Practice. Articles republished from the *British Medical Journal.* (Pp. 278. 9s. net.) London: H. K. Lewis and Co. 1937.

It was a wise move on the part of the *British Medical Journal* to invite a series of articles on endocrinology and to republish them in book form. One's first impulse is to congratulate the Editor on planning the series and choosing the contributors, for the success of the enterprise is largely due to his generalship. It is curious that good endocrinologists have written bad books when left to their own devices and that the two best books on endocrinology have been produced when they have been led in editorial chains. Both these books were published by medical associations because important advances have been made and difficulty is experienced by the ordinary medical man in separating the wheat from the tares so assiduously sown by those whose interest in endocrinology is commercial. The American Medical Association's symposium on *Glandular Physiology and Therapy* (1935) was an amazing achievement, which it is fair to say no other country in the world could have duplicated, and it at once became the research student's bible, but it is rather heavy going for the ordinary practitioner. The *British Medical Journal's* book on the *Endocrines in Theory and Practice* is built on simpler lines and fulfils the task of bridging the gap between theory and practice. For, as Sir Humphry Rolleston indicates in his chapter on the history of endocrinology (curiously placed at the end of the volume), the output of scientific investigation has been enormous, and practical application of this new knowledge has not had time to keep abreast.

Much of the work of the past has been discredited because the extracts used were utterly powerless, excessively weak, badly contaminated, or given in vehicles or channels through which they were imperfectly absorbed or too rapidly excreted. Effects differ in different species, and there is therefore an immense field for clinical research, in which the only, but at the same time the indispensable, apparatus is a critical outlook and knowledge of the pitfalls of therapeutic trials in man. Powerful extracts are now available from almost all the endocrine glands, and in many cases the chemical constitution and formulae are known. Wherever possible, as suggested by Professor E. C. Dodds, dosage should be expressed in milligrammes of crystalline material, for the units derived from small animals such as the mouse and the rat need multiplying to astronomical figures to produce effects in man, and the practitioner, unconsciously influenced by memories of units of antitoxin and insulin, may be afraid to give adequate amounts. This may be one reason why the harvest of the new knowledge has so far been disappointing, and in the field of the sex hormones we can point as yet to little more than the relief of menopausal symptoms by oestrin and the acceleration of imperfect migration of the testes by gonadotropic hormone from the pituitary or the urine of pregnancy.

Many readers distrust popular reviews as they so often degenerate to the level of favourite prescriptions and unjustified generalizations. The present volume is free from such faults: the physiology of the glands is clearly described and therapeutic advice is based on experiment. The pituitary gland is described first, as befits its dominant role, and then follow accounts of the thyroid, adrenals, gonads, thymus, pineal, and parathyroid glands, with separate chapters on menstruation, pregnancy, and the menopause. It is invidious to cite names where all are good, but special mention must be made of the introductory chapter in which Sir W. Langdon-Brown discusses the present position of endocrinology. He points out how the endocrine glands have come under the control of the diencephalo-pituitary system and are linked with the central nervous system and the autonomic. The hormones themselves fall into two groups: the first, of complex chemistry, are formed by the pituitary gland, which uses them to stimulate or inhibit the secretion of the second, chemically simpler grade, by the other endocrine glands. The latter have affinities with the substances by which nervous impulses are transmitted, with the stimulants to the organization of the embryo, and with certain carcinogenic chemicals. We can now clearly see a future in which the halting language of infant science is discarded and we no longer speak of vitamins, hormones, or vagus-stuff, but of ascorbic acid, thyroxin, acetylcholine, and other equally well-defined substances.

L. J. WITTS.

THE PROBLEM OF DRUG ADDICTION

Drug Addiction. By E. W. Adams, O.B.E., M.D. (Pp. 174; 8s. 6d. net.) London: Oxford University Press, Humphrey Milford. 1937.

Drug addiction is a many-sided problem, and it is rare to find the subject dealt with as a whole, because few writers have knowledge of all its aspects, political, social, medical, and pharmacological. Dr. E. W. Adams has, however, very exceptional knowledge and experience, because not only is he a pharmacologist, but he has also had under the Ministry of Health full acquaintance with the administrative features of the problem. Hence his book, though short, deals with all the aspects indicated. With regard to the range of drugs discussed it may be mentioned that the author does not touch on alcoholism and devotes his attention especially to the "white drug"—namely, morphine, heroin, and cocaine. So far as these are concerned he gives a very full account of the world problem as it exists to-day. The only aspect he leaves alone is the commercial one. The manner in which the drug industry has catered for the vices of mankind is a lurid story, which probably has been omitted for reasons of prudence.

Dr. Adams gives a brief outline of the history of addiction to opium, to cocaine, and to morphine and its derivatives. The chapter on epidemiology is very clear and interesting. In this respect Great Britain occupies an exceptional position, since the number of addicts is estimated at less than 1,000, whereas the estimated figures for the U.S.A. and Canada are 100,000 and 8,000 respectively. One of the primary facts that British writers must remember in discussing the importance of drug addiction is that our country is exceptionally lucky. Aetiology is fully discussed; the association between crime and addiction is very clear in the United States, and the problem is whether addiction should be looked upon as the cause or the consequence of criminal tendencies. Dr. Adams suggests that there are at least three classes of addicts: accidental, natural, and criminal. The first class comprises normal persons who have accidentally become habituated to drugs. The second class are people of inadequate personality who seek in drugs an escape from reality. The third class are the fundamentally vicious type.

The pharmacological problems of the mechanism by which tolerance and addiction to drugs are established are dealt with fully, and so also are the methods of treatment. It may be said that, in spite of the intensive research that has been carried out during the last decade, there is as yet no satisfactory explanation of the pharmacological basis of drug tolerance and addiction. Hence methods of treatment are still empirical. With regard to therapeutic measures the author emphasizes the fact that it is useless to break addiction unless this is followed by some process of rehabilitation, since otherwise relapse nearly always occurs. Drug addiction, as we have said, presents a protean problem of which it is extraordinarily difficult to give a brief and yet comprehensive survey. Dr. Adams must be congratulated on having produced a well-balanced and readable account of this intricate subject.

A MEDICO-LEGAL VOCABULARY

A Dictionary of Medico-Legal Terms. For Criminal Lawyers and Police Officers. By Albert Crew and K. W. Aylwin Gibson, M.R.C.S., L.R.C.P. (Pp. 80. 5s. net.) London: Sir Isaac Pitman and Sons, Ltd. 1937.

One of the barriers which prevent the medical and legal professions from understanding one another is language. Medical men think in a rich and complicated technicology which means little or nothing to laymen. They are so used to this dialect that they forget that there is anything extraordinary about it. Experienced medical witnesses know how to make themselves clear to judges, counsel, and jury, but witnesses of less experience cannot escape from the bounds of their professional vocabulary, either in giving oral evidence or in writing reports. Moreover, medicine permeates the practice of law over a much wider field than most medical practitioners realize. A solicitor or barrister who handles personal injury cases, workmen's compensation cases, or probate actions, to mention only a few, often has to understand medical reports or proofs. This small dictionary will fill a great need, for it contains most of the ordinary medical terms which are met with, at any rate in criminal practice, and also most legal terms the meaning of which ought to be known by medical witnesses. Mr. Crew is a prominent members of the Criminal Bar and Dr. Gibson has long experience of the law; between them they have compiled an accurate and clearly intelligible series of definitions. The preface contains a caution to medical witnesses to use intelligible language, and the authors quote the classic instance in which a witness defined a black eye in terms of contusion, ecchymosis, and abrasion. The reviewer was recently taken to task for using this very instance, but maintains that it is still the best example of the misuse of technical jargon. The author's support for this view is reassuring.

LECTURES ON FEVERS

Maladies Infectieuses (Deuxieme Serie). Leçons Cliniques Professees a l'Hôpital Claude-Bernard. By A. Lemierre, (Pp. 310. 55 fr.) Paris: Masson et Cie. 1937.

In this second series of clinical lectures on infectious diseases—the first was reviewed in these columns two years ago (1935, **2**, 15)—Professor Lemierre deals with a number of cases, most of which found their way into the Claude-Bernard Hospital, a fever hospital in Paris. Although every case receives exhaustive attention in respect of aetiology, clinical symptoms, pathology, diagnosis, and treatment, yet each has been primarily selected for some special reason; thus two cases of Hodgkin's disease because they were mistaken for undulant fever; a case of Weil's disease because the jaundice was wanting; several cases of ulcerative pharyngo-stomatitis (misdiagnosed as diphtheria) on account of their causes (the administration of salts of mercury and bismuth in unsuitable patients, the eruption of teeth, and leukaemia). One case of kala-azar and a few of malaria are introduced, partly as a warning that these diseases are indigenous in certain districts of France, partly because of difficulties of diagnosis. A particularly interesting lecture is that on a case of a haemorrhagic exanthem due to novarsenobenzol, suspected of being haemorrhagic small-pox. The rashes caused by this drug may simulate those of certain of the infectious diseases, and Professor Lemierre discusses Milian's hypothesis of biotropism, according to which certain drugs have the power of bringing into action any micro-organisms which happen to be latent in the body, so that these drug rashes are really evidence of attacks of such diseases as scarlet fever and measles. This hypothesis, however, has not met with general acceptance. The remaining lectures are devoted chiefly to septicaemia due to organisms rarely found in that condition, and to unusual cases of erysipelas.

This volume affords highly interesting and instructive reading, valuable both to the specialist and to the general practitioner

CHRONIC RESPIRATORY DISEASES

The Diagnosis and Treatment of Chronic Diseases of the Respiratory Tract, with Especial Reference to the Lesions of the Trachea, Bronchi, Lungs, Pleura, and Diaphragm. By Elmer H. Funk, M.D. Revised by Burgess Gordon, M.D. (Pp. 618; 182 figures. 40s. net.) New York and London: H. Milford, Oxford University Press. 1936.

This book has been produced on a lavish scale, and is therefore published at a price which puts it out of the reach of many for whom it is intended—in this country at all events. The actual contents do not justify either the lavishness or the price. There is evidence of acute clinical observation, and there is a due appreciation of the relative importance of various factors in diagnosis and treatment; but the style is heavy, and the arrangement of the subject-matter is confusing and shows lack of proportion. Indeed at times the book suggests a collection of essays rather than a textbook. Thus special chapters are devoted to curiosities like fibrinous bronchitis, broncholithiasis, chylothorax, and hernia of the lung, subjects of no practical importance to the general practitioner, for whom presumably the book was written, since minute details of procedures like strapping the chest are given, and the use of expectorants and similar drugs is fully discussed. The summary handling of some subjects—for instance, twenty lines are devoted to the pathogenesis of pulmonary tuberculosis—is not merely uninformative but may be misleading. Several inaccuracies and omissions can be pointed out. Phrenic avulsion is discussed in four pages, but the "crush" operation is not mentioned; atelectasis and collapse are considered throughout as synonymous; and we cannot agree that congenital bronchiectasis is rare and of interest only to pathologists, or that only 5 per cent. can benefit by supplementing pneumothorax with pneumolysis. The author's close association with bronchoscopic clinics is shown by constant reference to the value of this diagnostic and therapeutic measure. In fact in discussing the lipiodol investigation of the lungs no details of the other methods of introducing lipiodol are given, such as the cricothyroid and transglottic routes—exclusively employed here. On the other hand several subjects, often ignored elsewhere, are discussed in this book in a practical and concise manner—for instance, heliotherapy in pulmonary

tuberculosis. Many useful skiagrams are reproduced in the text.

The scope of the book is not broad enough for the specialist in chest diseases; the points we have indicated above show that it is too wide for the general practitioner.

FLORENCE NIGHTINGALE

Florence Nightingale. The Woman and the Legend. By Margaret Goldsmith. (Pp. 320. 15s. net.) London: Hodder and Stoughton. 1937.

Here we have a further contribution to the literature on this remarkable Victorian, of whom thirteen other biographies are cited in the list appended to the present volume. The author gives a balanced account of Miss Nightingale's life and work, successfully resisting the temptation to be carried away by admiration and sympathy for her heroine, and giving adequate, though not undue, attention to certain defects in her character. Naturally there is much in this book to interest medical readers. The appalling conditions existing in the military hospital at Scutari, where Miss Nightingale arrived a few days after the Battle of Balaclava, are described in some detail. The unfortunate patients, many of whom were suffering from cholera and dysentery, were fed entirely upon meat; their quarters were overcrowded, ill ventilated, and filthy; the sanitary arrangements were at one time so inadequate that only twenty chamber pots were available for the use of two thousand men. The story of how Florence Nightingale, hampered at every turn by the intricacies of red tape and stubbornly opposed by the majority of the Army medical authorities, produced order out of chaos, ameliorated the lot of the wounded, and within six months reduced the death rate at the hospital by nearly 50 per cent., is an epic of determined perseverance and a triumph of organization.

In the concluding chapters the author does not unravel as clearly as one could wish all the threads of Miss Nightingale's later work. Apart from this criticism her book may be commended as an excellent biography of one whose life exerted an immense influence on hospital management and the nursing profession.

Notes on Books

The monograph by Dr. MARCEL GERVOIS, entitled *Le Bacille de Type Bovin dans la Tuberculose Humaine* (Lille, L. Daniel) consists entirely of a review of existing knowledge. The author is appalled by the general ignorance and apathy hitherto manifested in so many countries in relation to the problem of tuberculosis of bovine origin. At a time when there seems at last to be some evidence of awakening of the public conscience towards the hygiene of milk, he thinks it opportune to present a summary of the evidence on which our case against the bovine tubercle bacillus, and particularly milk-borne tuberculosis, is based. The monograph itself consists largely of tables reviewing the findings of different workers in different countries during the past fifty years. Some idea of the work involved may be gathered from the fact that the results of no fewer than 17,045 examinations of tuberculous material for determining the type of infecting bacillus have been collected, and that the table of figures giving the frequency of tubercle bacilli in milk covers eighteen pages. Even those who are well acquainted with the subject material will be astonished at the massiveness of the documentation which the author has been able to build up against the bovine tubercle bacillus. His general conclusion that pasteurization of milk affords the only immediate practical and efficacious method of combating tuberculosis of bovine origin is inescapable.

The realization that despite the great reduction in the infantile mortality rate in the last fifty years the neonatal death rate has not followed this downward path has led to an increased interest in the whole problem of the very young infant. In *Diseases of the Newborn* (H. Milford, Oxford Press, 27s. 6d.) Dr. ABRAHAM TOW has performed a valuable service by not only collecting the latest views in the literature, but also adding observation of his own, a particularly useful feature when he is discussing controversial matter. The subject is well covered from the preliminary considerations of physiological principles and feeding to more detailed discussions of the disorders commonly met with. The section on the premature infant is particularly good in its presentation of modern views, though it may be noted that the incubator is now being discarded in many centres. The chapter on birth injuries is somewhat uneven, and there is no indication that intracranial disorders (for example, cerebral oedema) other than actual haemorrhage may occur: Cruickshank's classical monograph on this has apparently not been consulted. This, however, is the only serious omission found, and the book may be confidently recommended to all those concerned in the care of the newborn infant.

Biological Time, by LECOMTE DU NOÜY, is a short volume in which this problem is dealt with in an original manner. The author, who is a distinguished physical chemist, assisted Dr. Alexis Carrel in his work during the war in Hospital 21 at Compiègne. The systematic study of the healing of wounds which they carried through showed that the process proceeded at a rate which could be expressed by mathematical formulae. They also found that the rate of healing was a function of the age of the patient. Later experiments with tissue cultures showed that, when these were grown in serum, the rate of division was a function of the age of the animal from which the serum was taken. From these and similar experiments the author deduces the idea of a biological time which alters with age. Such a conception is of course familiar to biologists in general and clinicians in particular. One of the most obvious facts in clinical medicine is that a diseased infant changes its condition far more rapidly than does an adult. From these familiar facts the author makes a variety of interesting philosophical deductions concerning the nature of time. His book is published by Methuen and Co. at 7s. 6d.

The Proceedings of the second International Medical Week in Switzerland have now been published. This congress was held at Lucerne in the first week in September last year. The majority of the papers read then appear in German, but some are in French, including the opening speech by Dr. H. Carriere, director of the public health service in Berne. The main subjects under discussion related to diseases of childhood, hormones and vitamins, and affections of the circulation and respiration, but various papers on other medical subjects are incorporated in this report, which is produced by the *Journal Suisse de Médecine* and published by Benno Schwabe and Co., Basle.

Dr. JAIME MENDOZA'S *Notes of a Doctor* (Sucre, Escuela Tifografica Salesiana) are divided into two unequal parts. The first and larger part, entitled "Essays," deals mainly with the medical aspects of Bolivia, especially as regards the incidence of tuberculosis, congenital syphilis, and malaria in that country; while the second part is devoted to psychiatry, the history of the Medical Institute at Sucre, founded in 1892, and infant welfare.

Dr. ROBERT HUTCHISON'S wise little book on the *Elements of Medical Treatment*, which originally appeared rather more than ten years ago, has now come out in a third edition, and the author has made some minor changes and additions to bring his material abreast of present practice. The publishers are John Wright and Sons; the price is 5s.

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THE WORK OF THE MINISTRY OF HEALTH

The Ministry of Health is not merely concerned with health, a fact which has to be noted in relation to the financial statistics contained in its annual report[1] and widely quoted. Much local government activity not directly affecting the health of the people comes under its purview, especially if capital expenditure is involved, and the block grant it administers covers many services. It is therefore difficult to discover what the country spends on the preservation and restoration of health out of moneys raised by central and local taxation. In 1936–7 central departmental administration cost £2,219,985. On national health insurance £34,200,000 was expended out of a revenue totalling £37,400,000, which contained an Exchequer grant of £5,925,000. The outlay included £6,868,900 paid to insurance practitioners in capitation fees, £204,000 for mileage, £190,000 for medicines and appliances supplied or dispensed by them, and sundry smaller sums for medical purposes. For objects, therefore, which are directly intended to promote health, rather more than thirty-six millions were spent through central channels in addition to grants to local authorities. On what is called public health local authorities disbursed £44,200,000 net (which included expenditure falling on Government grants), but this covered items like baths, washhouses, parks, and public conveniences, which do not fall within the province of public health unless the term is used in a very broad sense; while the cost of the school medical service and the very large organization for the care of the sick under the Poor Law are not separately distinguished. The treatment of mental disease and deficiency cost about £11,800,000, and housing £16,800,000 net, towards which grants amounting to more than fourteen millions were received from the Ministry. If the very substantial proportion of public assistance expenditure (totalling just short of £40,000,000) attributable to domiciliary and institutional care of the sick were added the local cost of sickness and the preservation of health might be estimated at about £100,000,000.

[1] Ministry of Health, Eighteenth Annual Report, 1936–7. H.M. Stationery Office, Cmd. 5516. 1937. (5s.)

Figures of this order, while falling far short of the whole cost of what are called the social services, naturally impel the Minister to prove that they are balanced by returns in the form of a healthier and fuller life for the people. The standardized death rate has fallen from 13.0 to 9.2 per 1,000 since the Ministry was constituted in 1919, the infant mortality per 1,000 live births from 89 to 59. Even the maternal mortality rate was unusually low at 3.81 per 1,000 live births. The provision of 3,000,000 new and decent houses, it is stated, "is probably the greatest contribution which this generation has made to better health." Since 1901–10 the standardized mortality from pulmonary tuberculosis has been more than halved, while the rate for the non-pulmonary form is now actually little more than a quarter of what it was then. Emphasis is laid on the new service of midwives provided under the Midwives Act, 1936, and on the expectation of an improved maternity service as the result of the Ministry's and the local authorities' reactions to the recently issued report on an Investigation into Maternal Mortality. It is pointed out that developments in public health and social services are rarely dramatic in their coming. Advances are made, gaps filled up, machinery overhauled, and salients smoothed. The Minister is justly pleased with the general effect, and is determined to promote a campaign of public education extending over six months of the coming winter, designed to induce the public to make fuller use of the public health services. But there are serious gaps remaining to be filled and some salients from which a retirement might possibly be contemplated. Extension of medical benefit requires to be carried much further than the "under sixteens," and new types of provision of a specialist character for insured persons are rather urgently required. The whole question of the relation of the clinical services of local authorities to insurance and private practice needs serious consideration. The proposal to amend the rules for midwives so as to establish a service of semi-specialist obstetricians is a bad form of the advance by capturing salients, since it does nothing to bring even these elect into ante-natal contact with the women they may be summoned to confine. The Ministry's regard for the continuity of medical care of the sick poor through local panels of practitioners has been lukewarm; nor does it recognize as of public health importance the public medical services organized by the profession. In a field more remote from medical practice, the anomaly that such records of sickness as insurance provides are buried in the archives of friendly and approved societies ought to be faced after a quarter of a century of its persistence. The dissatisfaction, too,

which younger members of the public health service freely express as to the existing machinery for filling vacancies in that service deserves notice.

The medical profession, through the British Medical Association, has fostered and will continue to support efforts in behalf of the public health. It welcomes the evidence this report affords of the general soundness of the measures which have been taken. Advance by salients and the filling of gaps are good tactics, but the Association believes that they should be part of a carefully thought-out strategic plan, a plan in the preparation of which it is ready to help, in conference both with the Ministry and with the local authorities, who are shouldering health responsibilities in the exercise of which they would be wise to consider advice from every well-informed quarter.

TOXOPLASMA AND PROBLEMS OF IMMUNITY

The subject of the toxoplasma is hardly one with which the majority of medical men are familiar. Yet it is not unimportant, for these parasites occur quite commonly as latent infections in several experimental animals—rabbit, guinea-pig, mouse—introducing a complication in transmission experiments; and they have occasionally been reported as causing disease in man. It is true that most of these reports have been unconvincing, but Bland's evidence[1] that toxoplasma are the cause of glandular fever cannot be so lightly dismissed and certainly calls for further investigation. Toxoplasma are small oval or pyriform parasites about 6 $\mu \times 3 \mu$ in size, with definite nucleus and protozoan appearance. They have been described in a number of species of birds, including the sparrow, *Passer domesticus*, and have been observed in the rabbit in Brazil by Splendore[2] and by Nicolle and Manceaux[3] in the African gondi, a small mammal of the desert. As already indicated, their occurrence in laboratory animals has been noted by several workers, some of whom have made these parasites a subject of special study (Levaditi *et al.*[4]). Despite this the taxonomic position of toxoplasma remains obscure, and, apart from saying that they are intracellular parasites most commonly found in the liver and spleen and that they can multiply by longitudinal division, not very much is known.

The most recent addition to the literature of this subject is a short article by A. B. Sabin and P. K. Olitsky.[5] These workers encountered toxoplasma in the course of their investigations on viruses, and, struck by the fact that many of the problems presented by the study of these highly organized parasites are very similar to those met with in the investigation of filterable viruses, they decided to study toxoplasma more closely. Perhaps their most interesting observations and comments concern the question of immunity to these parasites. They observed, as did Bland, that the inoculated monkey develops a febrile not-fatal illness, recovery from which is associated with immunity to reinfection. They further noted the presence of neutralizing antibody in the blood, the test for which consisted of making mixtures of serum and a suspension of toxoplasm-containing tissue and injecting it intracerebrally or intraperitoneally into mice or intradermally into rabbits. It will be recalled that a year or two back Sabin[6] published a series of papers in which he claimed to show that virus and neutralizing antibody did not unite *in vitro*, and concluded that the function of neutralizing antibody was not to unite with the virus but with the susceptible tissue cells, which it protected in so doing. He further suggested that the antigen responsible for the production of neutralizing antibody was not a component antigen of the virus but the product of the tissues of the infected host. According to Sabin the mechanisms of immunity to a virus and to a bacterium differed fundamentally. This view is now supported by experiments made with toxoplasma. Sabin and Olitsky find that in neutral mixtures of immune serum and toxoplasma the parasites undergo no agglutination or lysis even after several hours' incubation, and that the toxoplasma recovered from such mixtures by centrifugation and freed from serum are fully infective. They further draw attention to the solid immunity which may be found in recovered rabbits, despite the fact that little or no neutralizing antibody is demonstrable in their serum, an immunity which they consider to be solely an affair of the tissues.

It may be that a true tissue immunity unassociated with antibody does occur. Possibly the immunity to the virus of poliomyelitis may be of this nature, and the "interference phenomenon" demonstrated by Salaman[7] in the case of the X virus of potato and by Findlay and MacCallum[8] with yellow fever virus is probably an example of a tissue immunity. But the mere inability to demonstrate free neutralizing antibody in the blood is not sufficient reason for assuming the existence of a pure tissue immunity. And as far as the union of virus and neutralizing antibody *in vitro* is concerned might it not be that an optimum balance between antigen and antibody was necessary for the demonstration of this union? This

[1] *Brit. J. exp. Path.*, 1931, **12**, 311.
[2] *Rev. Soc. sc. São Paulo*, 1908, **3**, 10.
[3] *Arch. Inst. Pasteur Tunis*, 1909, **2**, 97.
[4] *Ann. Inst. Pasteur*, 1929, **43**, 673.
[5] *Science*, 1937, **85**, 336.
[6] *Brit. J. exp. Path.*, 1935, **16**, 70, 84, 158, 169.
[7] *Nature*, 1933, **131**, 468.
[8] *J. Path. Bact.*, 1937, **44**, 405.

emerges clearly from the experiments of M. H. Salaman,[9] which demonstrate that union between vaccinia virus and its neutralizing antibody does occur *in vitro*, but that this might easily be missed unless the correct absorbing dose of antigen were used. Furthermore, it would seem wise before drawing comparisons between the action of protective antibody on viruses and on bacteria to make quite sure what really does take place in the latter case, for recent work by Enders and Shaffer[10] has shown that what some have thought to be phenomena peculiar to viruses and their antisera can be demonstrated equally well with Type III pneumococcus and its antiserum.

A CIRCULAR TO PREFECTS

The establishment of a co-ordinated scheme of health government in a new country where the ground is unencumbered by relics of any previous ventures may be a comparatively simple task. But where existing organizations of long standing require preliminary absorption or extinction the sure founding of a new system is not so easy. Each successive need may have been met in the past by legislative or other changes, each good enough in its day and still of some value, but on a general view revealing much inequality of distribution, some areas enjoying an embarrassment of service while others are left untended. In any well-governed country which can look back to a historic past the natural tendency is to give co-ordination a trial before resorting to more drastic measures. This has been evident in France lately, when the Minister of Health issued a Circular to Prefects on the co-ordination of services and institutions. He had observed, despite remonstrances by his predecessors in office, a tendency in too many departments of the country to isolated action by hospital boards, relief agencies, and others. His problem was how to bring these various bodies into touch with one another. He resolved to use the financial lever, and accordingly issued his circular announcing that there would be no more grants in aid other than to services affiliated to the official social hygiene bureau of the area, which would thus co-ordinate all their activities. In cases where this could not be done for any reason the Prefect was to appoint without delay a local co-ordinating committee for the same purpose.

The circular is of interest not only as an administrative instrument but also on account of an article by the Minister, in collaboration with the head of a department, which serves as an introduction to the circular as printed in the *Revue d'Hygiène*.[11] In this paper the Minister explores the fundamentals of communal health control. The essential conflict of interest between the individual and the community, he says, has been exacerbated by repressive sanitary legislation, but it is the aim of hygiene to restrain anti-social inclinations by ministering to the physical, mental, and social diseases of the people. In all public health work he urges the importance of the social outlook. The medical officer should have experience of family practice, which gives social insight. The health visitor should be fitted for both hygienic and social duties. The welfare centre can never effectively safeguard the health of the persons who frequent it unless it can extend its influence into their homes. Domestic hygiene and social service are inseparably intertwined, and the centre itself should work in liaison with the public assistance authority. In the field of mental prophylaxis, while recognizing that good may result from early treatment in clinics attached to mental hospitals, the Minister considers that in many cases still earlier intervention is required. The trained health visitor, as she moves among the homes of the people, is well fitted to bring to light unhappy or delinquent children who are oppressed by their home conditions and whose parents stand in need of either advice or warning. The reconciliation of traditional medicine with technical medical science is a problem in France as in other countries, but free choice of doctor should be maintained and a direct financial relationship should exist between doctor and patient. Vaccination, disinfection, and the removal of infectious cases to hospital no longer comprise the entire field of public health. Uncertainty for the morrow, whether individual or national, is one of the main causes of the physical, mental, and moral sickness of the time. For such conditions social service as an integral component of public hygiene may do much.

[9] *Brit. J. exp. Path.*, 1937, **18**, 245
[10] *J. Immunol.*, 1937, **32**, 379.
[11] *Rev. d'Hyg.*, 1936, **58**, 561.

AURICULAR FIBRILLATION AND CONGESTIVE FAILURE WITHOUT ORGANIC HEART DISEASE

More than any other arrhythmia auricular fibrillation is a symptom of organic heart disease, especially when it lasts more than a few days. There are, however, exceptions to this rule, notably when fibrillation is associated with toxic goitre, where an alteration in the functions of the myocardium without structural change is assumed, since removal of the offending gland, if not too long delayed, is quickly followed in most cases by a return of normal rhythm. Short paroxysms of fibrillation are not at all uncommon in infections, especially in pneumonia, apart from any structural disease of the heart. In another group of cases fibrillation is an isolated symptom, unassociated with any discoverable disease of the heart or other organ; here the arrhythmia may be a chance discovery, or attention may be drawn to it through palpitation. Most often in this group the condition is of short duration, occurring in short paroxysms; but it may be permanent. Generally the irregularity is well borne, the ventricular rate being not very rapid. An exceptional case believed to be of this type, and in which congestive failure developed, is reported by Brill.[1] His patient, a woman aged 43, had no rheumatic history; blood pressure was normal; there was no arteriosclerosis and no goitre; before treatment

[1] *Amer. Heart J.*, February 13, 1937, p. 175.

the ventricular rate was 160, and from the history it appeared probable that the arrhythmia had been present for several weeks, the onset being preceded shortly by a sinusitis. After digitalization congestion quickly disappeared and the ventricle slowed to 85 per minute; a trial dose of quinidine (3 grains) unexpectedly restored normal rhythm; the patient was soon able to resume a normal life, and has remained well during subsequent observation for one year. Electrocardiograms during the attack revealed no abnormality apart from the rhythm and digitalis effects; radiographs taken after the disappearance of failure showed a cardiac shadow within the normal limits of size and shape. The investigations carried out on this patient would appear to exclude all the usual causes of congestive failure with fibrillation: absence of clinical and radiographic signs of mitral stenosis and the subsequent course are against rheumatic heart disease; there was no evidence of coronary occlusion, nor of hypertension or toxic goitre. This case, in which it is presumed that fibrillation with a rapid ventricle had been present for some time before severe symptoms developed, seems best explained by analogy with the rare cases of paroxysmal tachycardia where, though no organic heart disease exists, a long-continued rapid beating finally leads to myocardial exhaustion. The only apparent explanation for the abnormal rhythm was the sinus infection which shortly preceded it. The use of quinidine, though now regarded as unjustifiable in the presence of severe organic heart disease, as is usual when there is congestion, is held to be rational in the above case, in which, after the relief of symptoms, no structural lesion was found.

THE HEADACHES OF LADY ANNE CONWAY

Lady Anne Conway died in 1679, a life-long sufferer day and night from severe headaches, which in her latter years were associated with "fits." In addition to the constant pain she suffered much at the hands of many physicians, for she was treated by her kinsman, Dr. William Harvey, by Dr. Willis, by Sir Theodore Mayerne, by Van Helmont, and, as she lived at Ragley, seven miles from Stratford-on-Avon, by Dr. Stubbs, the local practitioner. For a time she passed under the hands of Valentine Greatrakes, a quack who promised much by his method of "stroaking," but failed to give her relief. In spite of such a grave disability Lady Conway became a great metaphysician, and Dr. Henry Moore of Cambridge, "who was almost perpetually in her chamber," used to speak of her as his "heroine pupil." It is said that her ruling passion was for the most abstruse treatises on philosophy and mysticism. Dr. Macdonald Critchley, in the April number of the *King's College Hospital Gazette*, reconsiders the nature of her illness, and arrives at the conclusion, as Dr. Gilbert R. Owen had done before him, that Lady Conway probably suffered from major migraine and not from tumour, aneurysm, or hydrocephalus, as has been suggested at various times. The Rev. John Ward, who was the contemporary vicar of Stratford-on-Avon, reports: "My Lady Conway hath a tumour on one side and a scirrhus of ye Mesenterie as is supposed, as Mr. Stubbs says. She came into this miserie by a brother of hers who had some skill in chymisterie and tried experiments uppon her." She lies in the Arrow churchyard, just outside the gates of Ragley Park. She died while her husband was in Ireland, and Van Helmont caused her body to be preserved in a coffin filled with spirits of wine and provided with a glass cover that Viscount Conway might see her face when he returned to England.

THE MECHANISM OF ACCOMMODATION

Whether from satisfaction with the achievements of nineteenth century physics or from sheer irritability at the unsuspected complexities of the eye, Helmholtz considered it a very imperfect optical instrument which no respectable optical manufacturer would have made. One of the complexities of the eye is the faculty of accommodation. That some mechanism exists whereby objects at different distances can be clearly focused at the retina was, of course, appreciated in antiquity, and the failure of this mechanism after middle life was a serious matter when glasses as an artificial means of correcting it were not known. No clear distinction between presbyopia and hypermetropia was achieved until the days of Donders, and it was only in the second half of the last century that the puzzling fact that some young people benefit from glasses generally used by old people—"old sight" in young people—was clearly understood. As to the nature of accommodation itself, though Scheiner proved it conclusively in 1619 with the simple experiment of looking at a needle through two pinholes, subsequent observers advanced a host of arguments to dispute not only various explanations of accommodation but its very existence. When accommodation was finally accepted as a fact it was left to the genius of Thomas Young to reduce a mass of hypothetical explanations to one which implicated the lens, and the lens only, as the site where changes occurred to allow the focusing of both distant and near objects; and since his days the dispute has centred round the exact mechanism whereby the lens changes its refractive power. Thomas Young himself held that the lens had muscle fibres which made changes in contour possible, but the explanation which finally came to be accepted almost to the exclusion of all other views was the one advanced by Helmholtz in the fifties of the last century. Underlying Helmholtz's theory was the conception that the lens was in a state of constant tension during rest; many later workers regarded this idea as unphysiological, and the arguments on the subject have often assumed a metaphysical tinge. The broad facts of Helmholtz's explanation have, however, held their ground; what has been disputed is the relative value of different factors. Largely owing to the work of Tscherning the exact changes in the contour of the lens during accommodation can now be more clearly appreciated. The uniform increase in spherical contour postulated by Helmholtz has given way to the

demonstrable formation of something like a central anterior lenticonus with a flattening of the periphery. Such a deformation of the lens during accommodation does not fit in with Helmholtz's conception that contraction of the ciliary body, leading to relaxation of the suspensory ligament, allows the lens previously under tension to assume its normal globular form. Modern views emphasize not the elastic nature of the lens but its plasticity, and Helmholtz's explanation does not solve these difficulties. Granted the plasticity of the lens, a host of theories have been advanced to explain the peculiar deformation that the lens undergoes during accommodation. Pressure from the vitreous and pressure from the aqueous are but two of these. Of late years much attention has been paid to the capsule of the lens as the means of moulding the plastic lens. The work of Hess and Gullstrand was ably elaborated by Fincham, who held that the deformation of the lens seen in accommodation could be explained by the differences in thickness seen in the capsule at different points; a central anterior lenticonus follows naturally since the anterior central part of the capsule is the thinnest. Thus, while the essential details of Helmholtz's theory still stand, the appreciation of the part that the capsule plays is held to resolve some of the difficulties in the original theory. The stress upon the part played by the capsule has its origin in theoretical conjectures. The mass of laborious work that Fincham has brought forward in support of this explanation is ably summarized by him in a monograph.[1] Most of the work has been published as individual articles from time to time as the facts accumulated. The student of the subject will be glad to have it in the present form free from the repetition that a series of isolated articles must of necessity contain.

THE NATION'S CRIMINALS

"The Amazing Dr. Clitterhouse," in the popular play now running in London, continually raises his glass to "Crime and Research." Had he possessed himself of the Home Office annual report on criminal statistics[2] he might have found enough to engage him without pursuing the adventures among crooks which led to his own undoing. When it is stated that in 1935 (the latest statistical year) over three-quarters of a million people were found guilty in the courts of some offence or other, it seems a big proportion of the population of 35 million (excluding children under 10) of England and Wales. More than half these persons, however, were traffic offenders—although, of course, that may mean in some cases an offence as heinous as anything in the calendar. The bulk of the remainder were guilty of non-indictable offences, such as drunkenness and breaches of by-laws, and only 70,000 had committed crime, chiefly theft. Of the 70,000 indicted more than 60,000 were males, three-fourths of them being under 30 years of age. Larceny appears to be the crime of youth, frauds and false pretences the crimes of maturity. Crimes against the person have diminished during the present century. The number of cases of malicious wounding is only a fraction of what it was a generation ago, though there is an increasing tendency for violence to accompany crimes against property. Rape and indecent assault are less frequent, but the number of cases of defilement of girls under 16 has increased. Leaving out bigamy, which is grouped among sexual offences in the police records, such offences have fallen from an annual average of 779 for the years 1900-4 to 500 for the years 1931-5. The number of persons in England and Wales who committed suicide in 1935 was just over 5,000. Far more males than females commit suicide, but the number of those who make the attempt and do not succeed is more nearly equal as between the sexes. The suicide age for women is between 40 and 50; for men it is over 60. The number of criminal lunatics (the word has not passed out of the language when mental disorder is linked with crime) received at Broadmoor and at county and borough mental hospitals was 127, of whom forty-five were "King's pleasure lunatics," being found either insane on arraignment or "Guilty but insane," and the others were "Secretary of State's lunatics," being found insane after conviction. Perhaps more important sociologically than the crime is the manner of dealing with it. In view of the Home Secretary's decision to appoint a committee to review the question of corporal punishment, on which such a variety of views were put forward at the recent Annual Representative Meeting, it is interesting to learn exactly how often the courts impose such sentences. Corporal punishment may be inflicted as an additional penalty for robbery with violence; also for any attempt to choke or suffocate (but not for otherwise assaulting) a person with intent to commit an indictable offence such as rape; for being an "incorrigible rogue," though in fact the only offence coming within this category for which corporal punishment has been ordered in recent years is indecent exposure; and in the case of male persons living on the earnings of prostitution or soliciting for immoral purposes. There is also power to inflict whipping on boys between 14 and 16 for malicious damage, arson, and larceny. In the ten years from 1926 to 1935 sentences of corporal punishment have been imposed by the courts of assize and quarter sessions in 253 cases, of which number 235 were cases of robbery with violence, 129 of the offenders being sentenced to the cat and the remainder to the birch. Another class of cases is that in which corporal punishment—not more than six strokes of the birch rod—is inflicted by juvenile courts. The number of such sentences passed in 1935 was 218, and the ten-year average has been below 200. The great majority of the one thousand juvenile courts in England and Wales, including the metropolitan courts and the courts of the principal towns, do not use the method. The 218 boys who were birched during the year under review were not necessarily worse than their fellows, but they had the ill luck to come before the few courts—mostly in the counties and smaller towns—which have not learned to spare the rod.

[1] *Brit. J. Ophthal.*, 1937, Monograph Supp. VIII. London: G. Pullman and Sons, Ltd. 1937.

[2] *Criminal Statistics, England and Wales, 1935.* Issued by the Secretary of State for the Home Department. Cmd. 5520. H.M. Stationery Office. (3s. 6d. net.)

ANAESTHESIA IN GENERAL PRACTICE

This is one of a series of articles, contributed by invitation

DEPTH OF ANAESTHESIA FOR VARIOUS OPERATIONS

BY

C. LANGTON HEWER, M.B., B.S., D.A.

It is frequently stated that the least possible quantity of the least toxic drug or combination of drugs should be administered to produce just sufficient depth of anaesthesia for any given operation. Like most generalizations this is only a half-truth. At first sight it appears most laudable to produce the lightest degree of narcosis which will enable the surgeon to perform his task, as it is evident that the less a patient inhales of a toxic drug the less there is to eliminate, and consequently metabolic changes will be minimized.

Operative Shock

In practice, however, a formidable difficulty arises. One of the causes of operative shock is the effect of traumatic stimuli on the central nervous system. This "reflex" type of shock was at one time thought to be due to exhaustion of the vasomotor centre from excessive stimulation. The modern view, however, is that there is a definite inhibition of the centre by certain afferent stimuli. Whatever the actual mechanism may be, this type of shock can be greatly diminished by deep general anaesthesia and practically abolished by suitable local analgesia which prevents the stimuli from reaching the central nervous system. A good example of the first method is afforded by the operation of osteoclasis for rickets. If the child is lightly anaesthetized he may show signs of severe shock immediately after fracture of the bones, but if he is deeply etherized the pulse rate and blood pressure may scarcely change. As examples of the protection afforded by nerve-blocking, a disarticulation through the hip-joint or a hind-quarter amputation may be cited. The immediate effect on a patient's condition may be almost unnoticeable under spinal analgesia. As a rule it is not possible for the general practitioner to perform combined methods of general and local anaesthesia, so that in this article it will be assumed that he only has the simpler forms of general anaesthesia at his disposal.

Abolition of Reflexes

The question of reflexes must next be considered. It is obvious that the normal response to stimuli must be abolished, but what of the protective cough reflex? If there is any possibility of liquid or solid material reaching the air passages during the performance of the operation either the anaesthesia must be kept sufficiently light to preserve the protective cough reflex, or adequate provision must be made to prevent aspiration, such as by endotracheal anaesthesia, with packing, suction, etc. It is possible for the operation to induce inconvenient reflexes unless anaesthesia is extremely deep. For example, if an inflamed bladder is distended with fluid before cystoscopy straining will occur unless the narcosis is carried to a very deep plane.

In certain cases a light anaesthesia may be more dangerous than a deep one. For instance, if chloroform or a mixture containing it is being used there is an increased risk of primary cardiac failure if the patient is incompletely anaesthetized, the most dangerous period being at the end of the second stage. In most prolonged operations there are times when the anaesthesia can be appreciably lightened without detriment to the surgeon's work, and a careful anaesthetist who takes advantage of these periods may save his patient much unpleasantness afterwards by a quicker recovery and freedom from after-effects.

Lastly, we have to remember that deep anaesthesia is not always accompanied by complete muscular relaxation. Straining may actually occur during overdosage if the airway is partially obstructed. Conversely, the anaesthetist who is always careful to maintain a perfectly clear airway will find that he can obtain adequate relaxation at a surprisingly light level of narcosis.

Passing next from the general to the particular, we have to consider the depth of anaesthesia necessary for certain common operations.

Minor Operations

Small surgical proceedings, such as circumcision, myringotomy, the incision of whitlows, the removal of superficial tumours, etc., do not give rise to an appreciable amount of shock and can consequently be performed under the lightest anaesthesia which will prevent reflex movements. The only proviso is that no chloroform or mixture containing it may be employed.

Dental Extractions

The removal of teeth does not require muscular relaxation provided that a prop or gag has been inserted in the mouth before anaesthesia. In children the single-dose ethyl-chloride or di-vinyl ether technique is usually adequate. It sometimes happens that the depth of anaesthesia is such that the cough reflex is abolished. It is always wise, therefore, to insert a sponge or pack to obviate any chance of the inspiration of fragments of teeth. For short extractions in adults gas or nasal gas and air is the usual method. Although the cough reflex is generally unimpaired it is prudent to employ packing as an additional safeguard.

If a long dental operation is proposed the patient should, if possible, be removed to a hospital or nursing home and anaesthesia be conducted by the nasal endotracheal route, with packing. This is the only safe method of securing a smooth anaesthesia for an indefinite period. A plane of light third-stage narcosis will suffice for this type of operation. The actual techniques are discussed in another article.

Removal of Tonsils and Adenoids

The rapid guillotine method of tonsillectomy in children is as a rule performed under the single-dose ethyl-chloride or di-vinyl ether technique, preceded where possible by oral nembutal or rectal paraldehyde. Unfortunately the majority of such operations are performed upon out-patients and adequate premedication is impossible. A rather deeper anaesthesia is needed than for dental extractions, as the pharyngeal reflex should be abolished. Immediately after the removal of the second tonsil the child should be turned on to his side and allowed to come round until the cough reflex returns before the adenoids are

scraped. If any solid matter should then slip off the curette and be inhaled it will be immediately coughed up.

If the tonsils are to be dissected continuous anaesthesia is necessary. The simplest method is the pharyngeal insufflation of ether vapour through the tube on the tongue-depressor of a Davis gag. Anaesthesia must be sufficiently deep to enable the surgeon to exert traction on the tonsils without causing retching. With this plane of anaesthesia the cough reflex may be absent, so that blood must be prevented from reaching the larynx. This can be accomplished by suction and by the position of the patient. The latter varies with the individual surgeon, but is usually the "thyroid" position with extended head, or the lateral "Butlin" position with the head low. The only certain method of protecting the air passages from blood and debris is the nasal endotracheal technique with a gauze pack. Neither the tube nor the packing must be removed at the end of the operation until the cough reflex has returned.

Nasal Surgery

Short procedures such as antral puncture and turbinectomy can be done under a "single dose" anaesthetic technique.

In longer intranasal operations, such as sinus drainage or submucous resection of the septum, continuous anaesthesia is needed. Pharyngeal insufflation with a post-nasal pack or Shipway's ballooned airway is only safe if the cough reflex is preserved, since it is impossible to be certain that no blood will leak past the pack. Oral endotracheal anaesthesia with gauze packing or a ballooned tube is undoubtedly the method of choice, and an even level of narcosis can then be maintained with perfect safety.

Abdominal Surgery

Comparatively minor procedures such as operations for hernia and varicocele require little relaxation and can be performed under light third-stage narcosis. Extensive intra-abdominal operations, on the other hand, demand good relaxation. The nearer the incision is to the diaphragm the greater will be the respiratory excursion and consequently the greater the need for shallow respiration. The suturing of hollow viscera is both tedious and difficult if the suture line is moving over an extensive range. Furthermore, traction on the diaphragmatic attachments tends to cause reflex laryngeal spasm with consequent laboured breathing and poor relaxation. For these reasons an ordinary inhalation anaesthesia may not prove satisfactory for such operations as gastro-enterostomy, partial gastrectomy, and cholecystectomy. A thorough cocainization of the glottis may help to obviate laryngeal spasm, but the only certain preventive is the passage of an endotracheal tube. In many cases it is possible to use this technique without additional apparatus by means of "blind" nasal intubation, the administration being continued as before with a mask. A "gas" mixture is naturally preferable if an apparatus is available.

Pelvic and lower abdominal operations, such as appendicectomy and hysterectomy, can generally be performed satisfactorily with a straightforward inhalation anaesthesia carried well into the third stage. Prostatectomy, if done under general anaesthesia, necessitates the absolute minimum of ether, as the patient is practically always a poor risk with damaged kidneys, and often suffers in addition from chronic bronchitis.

There are three stages in an intra-abdominal operation when a deep plane of narcosis is necessary. They are (1) on opening the peritoneal cavity, (2) during traction on peritoneal attachments, and (3) on closing the peritoneum. The "sewing-up" must be anticipated by some minutes as it is impossible to deepen the anaesthesia suddenly, and straining at this stage is particularly trying. Similarly, a surgeon who without warning suddenly explores the gall-bladder, having finished an appendicectomy, may upset a lightly anaesthetized patient very badly. Renal operations performed through a lateral incision do not require such deep anaesthesia, as the peritoneum is not opened.

Thoracic Surgery

Minor operations upon the thoracic wall, such as the excision of breast tumours and the application of radium needles, can be carried out satisfactorily under quite light anaesthesia. A good technique is fairly heavy premedication followed by gas and oxygen.

Thoracoplasty can be performed by the same method if sputum is not excessive, but owing to the fact that the patients have a poor vital capacity and are lying on their sound sides an excess of oxygen should be used. This will necessitate the addition of small quantities of di-vinyl ether or, failing this, of chloroform. If cyclopropane is available and the diathermic cautery is not employed, an even better anaesthesia will ensue. The same remarks apply to the drainage of acute empyema if this is to be carried out under general anaesthesia.

Should a patient be coughing up an excessive amount of sputum (as in bronchiectasis) and an extensive thoracic operation be contemplated, the cough reflex must either be retained (as in high spinal or other local technique), or the fluid must be confined to the affected lung (as in intra-bronchial anaesthesia) or evacuated by tracheal or bronchial suction combined with endotracheal anaesthesia. These procedures are mostly outside the scope of the general practitioner and will not be considered further.

Thyroid Surgery

Operations for the relief of toxic goitre have recently become so frequent that some reference must be made to them. Since tracheitis is one of the most frequent sequelae the anaesthetic chosen must not aggravate it. Consequently the use of ether and the passage of tracheal tubes should be avoided unless respiratory obstruction is present. Since relaxation is not necessary a light level of narcosis is adequate, and the avoidance of toxic drugs such as ether and chloroform may just turn the scale in favour of an extremely ill patient. A good technique is heavy premedication or basal narcosis with avertin, followed by pure nitrous oxide and oxygen. The surgeon may prefer an additional infiltration with novocain and adrenaline or adrenaline solution alone (1 in 500,000) in order to separate tissue planes and minimize capillary oozing, but this is not essential. In total thyroidectomy for congestive heart failure cyclopropane is indicated, but for ordinary cases its employment causes excessive bleeding. (The depth of anaesthesia desirable in obstetrical practice is considered in another article of this series.)

The French Ministry of Public Health has instructed the venereal disease services to issue health passports to their patients. Each "carnet médical personnel" will be identified by a number instead of the patient's name and will contain the relevant data concerning diagnosis, clinical and laboratory findings, and instructions to be followed. When a patient leaves a venereal disease service this passport is to be given to him or to his new doctor.

ONE HUNDRED AND FIFTH ANNUAL MEETING

of the

British Medical Association

HELD IN BELFAST, JULY, 1937

THE SECTIONS

SUMMARY OF PROCEEDINGS

During the next few months there will be published in the BRITISH MEDICAL JOURNAL *the opening papers communicated to the Scientific Sections of the Annual Meeting at Belfast. The reports of discussions, concluded from last week (p. 288), are intended to give members who were not present a general idea of the proceedings.*

COMBINED SECTIONS OF MEDICINE AND SURGERY

Friday, July 23

Abscess of the Lung

With Professor W. W. D. THOMSON in the chair, the discussion on "Abscess of the Lung" was opened by Dr. L. S. T. BURRELL. He held that this disease was a very serious one and frequently fatal. A considerable proportion of single lung abscesses followed operations on the nose, throat, or teeth. Frequently the onset was insidious and even afebrile, the earliest symptoms often amounting to no more than malaise and a nasty taste in the mouth. Clubbing of the fingers was an early sign, while local evidence in the lung might only appear later. The speaker stressed the necessity of localization by *x*-ray films in different positions, but considered that stereoscopic radiographs were apt to be misleading. Although it had been said that the use of an exploring needle was dangerous owing to the risk of infecting a healthy pleura, he had never known it happen; at the same time he agreed that it was unnecessary to explore an abscess by this means. Treatment by postural drainage was best carried out by the use of the bed devised by the late Mr. H. P. Nelson; a full six weeks should be allowed before surgical treatment was considered. Bronchoscopic methods did little more than hurry drainage.

Mr. J. E. H. ROBERTS agreed that suppuration in the lung was extremely serious; delay in the diagnosis often contributed to the gravity, and the use of the tomograph might help to eliminate this factor. An abscess was always close to the surface of the affected lobe; only partial evacuation followed the opening into small bronchi, and large sloughs that could not have passed even through a main bronchus were commonly found at operation; further, the vessels in the walls of chronic abscesses became progressively obliterated. For these reasons he considered that postural drainage might fail owing to the small openings out of the abscess allowing only liquid pus to escape. Artificial pneumothorax was inadvisable, and bronchoscopic drainage had only a limited application. Mr. Roberts held that postural drainage and other medical measures might be continued as long as there was progressive improvement as judged by clinical and radiological methods. Failing this, operation should not be delayed longer than two weeks. External drainage by a two-stage operation under cyclopropane was the method he advised in the earlier stages. As often as not the opening of the thorax revealed thickening of the rib periosteum and opacity of the pleura, and the operation could then be concluded at the same sitting by incision and drainage of the lung. Lobectomy might be the best procedure in more chronic lung abscesses.

Dr. PETER KERLEY spoke of the radiology of lung abscess, and insisted that lateral views were important, in the lying as well as in the erect posture. Since signs might be indefinite, radiological control at intervals of three days was advisable. The tomograph promised to be of great help in the localization of lung abscesses. Radiography might help to distinguish an abscess due to new growth, since in such cases part of the wall of the cavity often showed no pneumonitis. Chronic suppuration might cause local malignant disease. If an *x*-ray showed cavities forming very rapidly a diagnosis of acute pneumonic phthisis should be considered rather than lung abscess.

Dr. CARL SEMB (Oslo) agreed that surgical intervention in lung abscess was often delayed too long. The patient should be under close observation from the onset of the illness, medical treatment being adopted during the first week or two. Using the same criteria for surgical intervention as those laid down by Mr. Roberts, he considered that operation in one or two stages should be undertaken within three to five weeks unless treatment by medical means was producing progressive benefit. Dr. Semb related his experience of seventy-four cases of pulmonary suppuration, which he considered was a not uncommon cause of empyema.

Dr. GEOFFREY MARSHALL regarded bronchial obstruction as a common cause of lung abscess. Dental extractions and anaesthetics were sometimes followed by pulmonary suppuration, and he had seen this condition caused by the unwise administration of morphine or hyoscine to control respiratory distress in asthma. Patients sometimes coughed up an abscess during transit to hospital or nursing home, and this had encouraged him to adopt what he termed "percussion drainage"; in this procedure the patient's chest was vigorously pummelled several times a day with the object of provoking drainage through the bronchi. An initial bronchoscopy should be made in all cases, but he felt that repeated bronchoscopic drainage was a useless method of treatment. Conservative treatment should be adopted for two weeks, and operation should then be delayed only if continued improvement was in progress with a leucocyte count below 12,000 per c.mm.

Dr. W. BURTON WOOD took the view that the bronchi were to be considered as "permanent air-shafts and occasional drains." The best treatment of lung abscess was drainage through these natural channels. In his view postural drainage was not always given a fair trial. Bronchoscopic drainage was a valuable means of treatment, and he had often performed this in order to overcome temporary blockage of the bronchi in the course of natural drainage. Of his group of forty-five cases of pulmonary suppuration twelve were considered to be suffering from septic pneumonitis. Medical treatment was adopted in twelve, all of whom recovered. Bronchoscopic drainage was employed in eight, while five recovered after a complicating empyema had been drained. Surgical drainage in eight cases resulted in two deaths directly due to the operation, while the remainder recovered.

Professor F. W. ARCHIBALD (Montreal) grouped cases of lung abscess into those caused by aspiration and those produced by infected emboli. The former were associated with pneumonitis and often followed bronchopneumonia. Embolism caused little surrounding reaction and good healing was possible, since the neighbouring lung retained its elasticity. He commented on the disparity of the views expressed regarding treatment: probably lobectomy was the best treatment when suppuration due to aspiration had continued two or three months.

Mr. G. R. B. PURCE (Belfast) had found no obvious cause in forty-one of his sixty-six cases of lung abscess. Unlike Maxwell, who recorded forty-three cases following pneumonia out of a total of 199, he had had no case from this cause. Embolism was a more frequent basis of abscess than was generally recognized. The bacteriology of the putrid abscess always included anaerobic streptococci, fusiform bacilli, and a spirillum. Two-thirds of all abscesses involved the lower lobes, the frequency being equal on the two sides. Medical and surgical treatment must be complementary. A surgical emergency arose if perforation of the pleura occurred before the abscess ruptured through natural channels. After this had occurred a perseverance in medical treatment resulted in cure in about 70 per cent. of cases. If in six to eight weeks continued resolution was not evident then operation should be undertaken. An abscess of many months' duration could only be dealt with surgically, and the mortality was then very high.

Mr. PHILIP ALLISON (Leeds) thought that there should be no hard-and-fast distinction between medical and surgical treatment; in every case both forms of treatment had to be applied at different stages. He disagreed with Mr. Roberts on the matter of bronchoscopic drainage, and said that in his experience this procedure was frequently successful in assisting the passage of pus through a large draining bronchus. If operation had to be undertaken complete removal of the roof of the cavity was essential. Too prolonged treatment by medical means often resulted in bronchiectasis.

Dr. BURRELL answered several questions that had been asked. He commented on the approximation of the medical and surgical views on the principles of treatment. Mr. ROBERTS also replied, with special reference to the statistics quoted by Mr. Purce. He thought that the failures of surgical treatment should be added to those of medical treatment in assessing the failures of conservative measures, since the latter had been tried without avail in the first instance. In any case he felt strongly that the results of present methods were so bad that the possibilities of earlier operation ought to be tried out.

SECTION OF OBSTETRICS AND GYNAECOLOGY

Friday, July 23

Forceps Delivery

In the absence of Professor JOSEPH DE LEE (Chicago), Professor C. G. LOWRY introduced Professor De Lee's film entitled "Forceps Operation, including Episiotomy and its Anatomy." The film was a talking one, and there was first a lecture given by Professor De Lee on the history and evolution of the obstetrical forceps, followed by a detailed description of the anatomy of episiotomy and its performance on a model. Then followed an excellent film of the delivery of the foetal head with forceps after the performance of episiotomy on the patient, and the film ended with a review of the case.

Breech Presentations

Mr. T. S. S. HOLMES (Belfast) then took the chair and Mr. H. I. MCCLURE (Belfast) read his and Mr. C. H. G. MACAFEE'S paper on a critical survey of 349 cases of breech delivery. The paper dealt with 349 consecutive cases seen in the Royal Maternity Hospital, Belfast, during the years 1932–6. The cases represented a frequency of 6.03 per cent. of all deliveries occurring in the hospital over the same period. In 638 of private cases the frequency was 2.5 per cent. Of the 349 cases 305 were primary breech presentations. There were seventeen cases of twins in which each child was delivered as a breech. Three Caesarean sections were necessary, otherwise delivery was effected by the classical methods. Tables were then given showing that the total number of primigravidae was 115 and multigravidae 217. The gross foetal mortality in the primiparae was 23.72 per cent., in multiparae 38.96 per cent. A further table showed the cases eliminated to obtain the corrected foetal mortality, which in primiparae was 10 per cent. and in multiparae 3.42 per cent., giving a total in both of 6.1 per cent. The paper then dealt with certain essential precautions which should be taken to reduce this mortality figure still further. External version should be done at any stage after the thirtieth week of pregnancy as soon as the breech presentation was discovered. The patient should be re-examined every week until the onset of labour. Of 134 patients upon whom this manœuvre was performed only one (0.74 per cent.) bore a stillborn child. An anaesthetic should not be administered lest undue force be employed and result in separation of the placenta. Non-intervention until the breech had ceased to advance was the policy to be followed. The posterior arm was brought down in the classical method of delivery, but the writers failed to agree with the usual instructions regarding the method of dealing with the anterior arm. The arm could, in the majority of cases, be easily brought down without rotation of the child's back and occiput across the hollow of the sacrum. Extraction of the after-coming head was accomplished by the usual methods, but they insisted on slow and gentle delivery to prevent tentorial tears.

In the discussion that followed Professor DANIEL DOUGAL (Manchester) said that he found himself in agreement with practically all that had been said. While admitting that the foetal death rate in breech cases was twice as great as in normal deliveries, he thought that the difficulties had been greatly exaggerated. External version was a most valuable contribution to the solution of the breech problem. He was very strongly opposed to early interference in breech cases with extended legs.

Mr. L. CARNAC RIVETT said he agreed almost entirely with the writers of the paper, especially in regard to the meddlesome midwifery of early pulling down of extended legs. He was not in favour of episiotomy. He often used an anaesthetic for version, as he found the greatest cause of difficulty was the mother's tense abdominal wall.

Dr. H. R. FREDERICK (Port Talbot) said that it bewildered the general practitioner to find views on the treatment of breech cases altering from year to year. Professor A. H. DAVIDSON (Dublin) held that the danger of breech delivery was overstressed. The important thing in a primiparous breech was to make sure there was no disproportion. If there was disproportion to any degree, then Caesarean section should be considered. The extended legs should not be brought down—they form a very good dilator of the birth canal. Dr. J. ARTHUR H. SHERWIN (Melbourne) also referred to Professor De Lee's film, and mentioned the *vis a tergo* which he had seen used to express the foetus out of the uterus to avert extension of the arms.

Professor LOWRY agreed with the views expressed by Professor Davidson as to the dangers of external version. It was a proceeding by no means free from risk. Dr. A. E. CHISHOLM (Dundee) emphasized the value of the application of lateral pads after version had been performed.

In addition to these speakers Professor E. C. CRICHTON (Capetown), Professor J. CHASSAR MOIR (Oxford), Dr. J. S. ENGLISH (Singapore), and Dr. A. FULLERTON (Batley) also spoke during the discussion.

Professor DAVIDSON then showed his coloured film of the operation of vaginal hysterectomy. He stressed the easy convalescence for the patient, and the bloodlessness and simple technique. He injected into and around the cervix a solution of 1/2 per cent. novocain with 10 minims to 100 c.cm. of 1 in 1,000 adrenaline.

Dr. KATHLEEN VAUGHAN then read an excellent and lucid paper on posture in childbirth, and showed several photographs of ancient steles showing the early methods of assisting parturition.

SECTION OF PATHOLOGY, BACTERIOLOGY, AND IMMUNOLOGY

Friday, July 23

Influenza: Four Years' Progress

The President, Sir THOMAS HOUSTON (Belfast), congratulated Professor S. P. Bedson on the conferment upon him of an honorary degree by the University of Belfast, and asked him to take the chair.

Dr. C. H. ANDREWES read his introductory paper entitled "Influenza: Four Years' Progress." He described the methods by which virus can be isolated from cases of influenza by ferret inoculation and its maintenance and behaviour in animals, and gave the reasons for regarding this virus as the cause of the disease. These included not only the isolation of the virus from cases in many different parts of the world, but the development of neutralizing antibodies during the course of the disease, and one well-authenticated case of the transmission of the disease from ferret to man after long-repeated passage in the former. Interest had been centred lately on attempts at active immunization, and he and his colleagues had shown that the titre of neutralizing antibodies could be markedly increased by a single injection of virus suspension from mouse lung. This method had been applied on a limited scale in human volunteers during last winter's epidemic, and although the results had been inconclusive owing to the outbreak of the disease among the inoculated individuals at so early a stage that immunization was incomplete, he was still hopeful that the method might prove of use, even in spite of the fact that different strains of the virus appeared not to be antigenically identical.

Dr. C. H. STUART-HARRIS described the results of a clinical study of influenza undertaken in connexion with the former speaker's work on its aetiology. The disease had to be distinguished from a type of febrile catarrh from which the influenza virus could not be recovered. A careful tabulation of the symptoms of both conditions showed that in some features they differed, notably in the fact that in influenza due to virus the onset was sudden with mainly constitutional disturbance, whereas in febrile catarrh the initial symptoms came on gradually and were referable especially to the upper air passages. The leucocyte count was of no diagnostic value, and post-influenzal debility had not been characteristic of the recent epidemic.

Dr. R. W. FAIRBROTHER (Manchester) reported the results of his study of the same epidemic in the North of England. Two methods were available for demonstrating immune bodies—the neutralization test and the study of complement-fixing antibodies. He and his colleagues had used the latter, and found that a titre of 1 in 4 or over was indicative of resistance to the infection; the test could therefore be used to distinguish those requiring immunization. In the event of an epidemic the successful immunization of the susceptibles would greatly reduce the disastrous effects of the outbreak. Experimental work on the immunization of mice had yielded encouraging results, but the application of similar vaccines to man had been disappointing. He and Dr. Hoyle had consequently been endeavouring to obtain a more satisfactory type of vaccine. The antigenic structure of the influenza virus was complex; it included both a "soluble substance," which resembled a haptene and was demonstrated by the complement-fixation test, and the elementary bodies, which were concerned in the neutralization test and were essential for immunization. They had treated elementary bodies in various ways—with formalin, phenol, and heat (50° C.)—and mice were protected by each type of vaccine. The results obtained in mice indicated that elementary body suspensions heated to 50° C. for thirty minutes and suspended in 0.5 per cent. phenol as preservative formed a convenient and useful immunizing agent. The preparation was almost non-infective, free from bacteria and extraneous material, and could be conserved at 0° C. for several weeks. Its effect on man had still to be investigated, but experiments on ferrets indicated that a high degree of protection would not be induced.

Dr. J. G. SCADDING described a clinical and bacteriological study of cases of influenza admitted to hospital during the recent outbreak. These had been classified into those without lung involvement, those with clinical but no *x*-ray signs of lung involvement, and those with distinct pneumonia; the last had been separated into five types, according to the severity of the condition and its distribution. Virus had been obtained from several of these cases, and a bacteriological examination of the sputum was made in all. Taken as a whole the types of bacteria found did not differ from those in non-influenzal infections of the respiratory tract, but there was a distinct relation between the nature of the lung involvement and the types of bacteria present. Cases with clinical but no *x*-ray signs of pneumonia were often infected by members of the *Neisseria* group, while the presence of pneumococci was associated with lobar consolidation. The speaker had formed the opinion that influenza was a descending infection of the respiratory tract which might be arrested at any level, and that bacterial infection might alter the picture in various ways. He also described the post-mortem findings in seven fatal cases; the characteristic features were tracheitis, interstitial inflammation, and sometimes necrosis of the alveolar walls leading to haemorrhage.

The CHAIRMAN (Professor Bedson) said that the existence of several antigenic types of the influenza virus certainly appeared to be a misfortune, but suggested that the neutralization test might possibly be exaggerating the differences between them. The absence of correlation between the results of the complement-fixation and neutralization tests corresponded to his own findings in psittacosis. Was the quantitative complement-fixation test really a measure of immunity?

Dr. C. E. VAN ROOYEN (Edinburgh) suggested that the intense degree of cellular parasitization by the influenza virus accounted for the liability to secondary bacterial infection in influenza. There was a similar liability in ectromelia and psittacosis. He had found the complement-fixation test of use in studies of vaccinia. The prospects for active immunization against influenza did not appear to him unfavourable, as others had thought. Was prontosil of any value in influenza?

Dr. ANDREWES, in reply, said that prontosil had been tried in experimental influenza in mice and found to be useless. The antigenic differences between strains of virus had been shown in mice to affect the results of immunization, and some human experiments suggested the same conclusion. He discussed the relative merits of the neutralization and complement-fixation tests, and pointed out that the latter does not distinguish between different strains of virus. It was important to know whether it could be relied on to indicate the degree of susceptibility. In view of the fact that artificial immunity is likely to be short-lived one difficulty in connexion with it was that of forecasting the epidemic for which it was required.

Dr. FAIRBROTHER, in reply, maintained that the complement-fixation test was significant, and pointed out that it is the only feasible test in a laboratory not lavishly equipped for such research. It might be possible to prepare a polyvalent virus vaccine.

Staphylococcal Infections in Man

Professor J. W. BIGGER (Dublin) opened a discussion on staphylococcal infections in man. Staphylococcal toxins had been known for many years to exist, but their full study was a recent development which had produced an extensive literature. He traced the discoveries leading up to this work, the main landmarks being the demonstration of the dermonecrotic toxin by Parker, the establishment of methods of producing toxin, and the Bundaberg disaster with the studies which ensued on it. The components and varieties of staphylococcus toxin as they are

now known were described. The effect of these discoveries was that it was now possible and desirable to treat severe and dangerous staphylococcal infections with an antitoxin, and to immunize actively in chronic infections with toxoid. The latter, to be effective, must contain all the components. Antibody titrations during treatment with toxoid were unnecessary, and the amount of antibody formation required to prevent infection varied in different individuals, possibly owing to differences in the condition of the skin. Staphylococcus vaccines might also be helpful.

Dr. H. J. PARISH (Beckenham) said that the antitoxin which was issued commercially in the British Isles neutralized the important toxic properties (lethal toxin, necrotoxin, α haemolysin, and both types of leucocidin) present in culture filtrates. Active immunization with toxoid, but not with vaccines, afforded protection against infection in laboratory animals. There was still difference of opinion about the clinical value of toxoid, antitoxin, and vaccines. The use of toxoid was a rational form of therapy in man, in whom good results had been reported by various workers in some staphylococcal diseases. With regard to chemotherapy, sulphanilamide (*p*-aminobenzenesulphonamide or prontosil album) protected mice against multiple lethal doses (1,000 to 10,000) of highly virulent strains of staphylococcus. As in the case of the haemolytic streptococcus, repeated doses of the drug were necessary to give protection for some weeks. Staphylococci persisted much longer than haemolytic streptococci in the tissues of the protected mice, and might often give rise to abscess formation in the liver and spleen. The results of experiments in mice suggested that sulphanilamide might be of value in the treatment of certain staphylococcal infections in man.

Dr. EILEEN O. BARTLEY (Belfast), whose paper was read by Dr. N. C. GRAHAM (Belfast), reported the results of the therapeutic use of staphylococcus toxoid. A follow-up of a series of cases reported a year before showed a higher proportion of cures than in the original figures. Styes responded best, then boils and dermatitis; sycosis was more resistant. She had titrated the antihaemolysin during treatment, and found an average rise from 1 unit to 7.7, but there was no relation between the degree of this increase and the clinical result.

Dr. S. C. DYKE (Wolverhampton) pointed out that antibody titration only indicated the amount of antihaemolysin formed, and agreed that this was unrelated to the degree of clinical improvement. Autogenous vaccines were sometimes more effective than toxoid: 90 per cent. of cases of recurrent boils could be cured by this means. He denied that diabetics more often contracted staphylococcal infections than other patients, but agreed that these infections were more dangerous when they occurred in diabetics.

Dr. EILEEN M. HICKEY (Belfast) described the successful treatment of a case of generalized staphylococcal infection with prontosil: relapse had followed immediately on the withdrawal of the drug no fewer than five times.

Sir THOMAS HOUSTON said that the original results with vaccines reported by Wright and Douglas were better than those obtained with toxoid. It was important to make an exact bacteriological diagnosis: he had seen cases apparently of pure staphylococcal infection in which in reality there was infection by the enterococcus as well, or by a haemolytic streptococcus. Dr. H. GUY DAIN (Birmingham) pointed out the importance of eradicating other foci of infection; an underlying condition might be a root abscess, and sometimes the antrum was at fault. Colonel A. H. PROCTOR described a study of active immunization carried out at the British Postgraduate Medical School. The anti-haemolysin titre was no criterion of success, and they had also found the bactericidal power of the blood useless as a guide. It was important in severe staphylococcal lesions to guard against secondary infection. Dr. GRAHAM also emphasized the necessity for bacteriological diagnosis; some boils were streptococcal. Dr. A. FELIX expressed his interest in a study which had shown that the phenomena of infection were due to the combined effect of several bacterial antigens.

Professor BIGGER, in reply, said that he believed the different effects of vaccines to be due to the variety of media on which the cocci were grown, and upon which toxin was produced in different amounts. A good toxoid must be derived from alpha and beta toxin and a sufficiency of leucocidin to be effective.

SECTION OF PHARMACOLOGY AND THERAPEUTICS, INCLUDING ANAESTHETICS

Friday, July 23

Anaesthesia in Minor Surgery

With Dr. OLIVE M. ANDERSON (Belfast), a Vice-President, in the chair, Dr. J. H. T. CHALLIS opened a discussion on this subject.

Dr. Challis said that anaesthesia for so-called minor surgical procedures required as much skill and ability on the part of the anaesthetist as did major operations, and that of the various anaesthetic agents available for this purpose no one drug was greatly in advance of the others in respect of efficiency and safety. The ideal anaesthetic for minor surgery should be safe, it should not hinder the patient from continuing his work, the necessary depth of anaesthesia should be available, consciousness should be regained quickly, and the anaesthesia should be pleasant to the patient. Local anaesthesia probably represented the nearest approach to this ideal. The intravenous barbiturates were difficult to use in small children and were contraindicated in the elderly. Nitrous oxide and oxygen was probably the most useful combination for inhalational anaesthesia when the conditions under which minor surgery was conducted in this country were considered. It was an advantage, but not essential, to administer previously a sedative. Dr. Challis recommended the oral administration of an alkaline powder immediately before nasal gas for dental extractions; this seemed to promote a quick and rapid recovery. Vinyl ether had a definite place in minor surgery. Ether was safe, and any required stage of anaesthesia could be secured and maintained. In the speaker's opinion this agent should always be employed for a second surgical intervention in a patient who was exsanguinated and was still bleeding after tonsillectomy. Chloroform was useful, particularly for obstetrical work. Although cyclopropane could not be classified as an entirely safe anaesthetic, it was not without its uses for the purpose under consideration.

Dr. J. H. GILLIES (Edinburgh) said that many anaesthetists were tempted to standardize both apparatus and technique and to apply it to major and minor surgery alike. For the latter purpose local and regional anaesthesia should be used whenever possible, but a keen judgement was desirable for the safe application of intravenous methods. For the enucleation of tonsils by the guillotine he recommended the use of up to 5 c.cm. of ethyl chloride evaporated gradually into a wide-bored Hewitt inhaler through which a trickle of oxygen flowed constantly. There was no cyanosis, but administration should cease as soon as the rapid deep breathing of the third stage of ethyl chloride anaesthesia was evident. For the longer operations of minor surgery, when nitrous-oxide-oxygen and ether, which was the anaesthetic of choice, was not available, the ethyl-chloride-ether sequence was satisfactory.

Dr. W. B. PRIMROSE (Glasgow) said that, notwithstanding the advances made recently in anaesthesia, the production of chloroform was increasing, and he interpreted this as indicating that this agent was being more commonly used for minor surgery. The inhalation of the heavy chloroform vapour involved a physical element of asphyxia which caused deprivation of oxygen, and this in many

cases led to difficulty. The toxicity of chloroform was apt to add its depressing effect and precipitate a collapse. This, however, could be obviated by the use of oxygen. When fully oxygenated, the medullary centres controlled the intake of the drug and automatically adjusted the depth of anaesthesia to the requirements of the surgeon.

Mr. J. S. LOUGHRIDGE (Belfast) said that local anaesthesia, nitrous oxide and oxygen, and sodium evipan were among the safest of anaesthetics. Each had its advantages and disadvantages, but by using two or more agents the advantages of all could be secured and at the same time their disadvantages could be eliminated. He had used a combination of agents, particularly in the simpler acute abdominal emergencies in bad risk cases. The method advocated was to begin the operation under local anaesthesia and to give nitrous oxide or sodium evipan as and when indicated. This method had been used without any apparent distress to the patient in cases of advanced cardiac and pulmonary disease.

Dr. RONALD JARMAN, referring to anaesthesia in children, said that, so far as premedication was concerned, nembutal, in appropriate dosage, could be given by the mouth or paraldehyde or avertin by the rectum. Every child should receive an adequate dose of atropine, and should as far as possible be unconscious of the injection. Nitrous oxide and oxygen, supplemented with ether if necessary, probably constituted the best method of induction, and with a suitable apparatus there should be no difficulty in giving it over any length of time. For dental anaesthesia it was easy to hasten induction with nasal gas and oxygen by spraying 2 or 3 c.cm. of ethyl chloride on to a piece of lint placed in front of the child's mouth. He considered that, for children, intravenous anaesthesia should not be encouraged, for even with some form of premedication the child remained conscious of the prick of the needle and would not forget this. In any circumstances it was essential to gain the confidence of the child. Dr. Jarman illustrated his remarks with a cinematographic film.

Dr. OLIVE ANDERSON asked what type of apparatus was recommended for administering gas and oxygen. There was anxiety in some quarters regarding the employment of heavy premedication in children. Dr. H. A. KELLY pointed out that in practice the anaesthetist has to use apparatus provided by the dentist, and in dental work premedication is usually impracticable. Dr. CECILIA WILLIAMSON (Ipswich), Dr. KATHARINE G. LLOYD-WILLIAMS, Dr. P. M. OVERTON (Bolton), and Dr. MARTHA E. HUTCHINSON (Belfast) raised further points, to which the openers briefly replied.

Vinyl Ether as an Anaesthetic Agent

Dr. VICTOR GOLDMAN, in initiating a discussion upon this subject, based his observations on a series of 1,191 cases in which no death or serious complications had occurred. Anaesthesia was produced with great rapidity; muscular relaxation was complete and similar to that obtained with ethyl ether. There was no irritation of the upper air passages, but there was increased salivation. Mixtures of vinyl ether and ethyl ether were satisfactory, and a mixture of 25 per cent. of the former with 75 per cent. of the latter had been advocated for use by the open method. It had been proved beyond question that this agent had little action upon liver function even when administered to patients with toxaemia of pregnancy. There was no appreciable change in the coagulation time of the blood, and the effect upon the blood sugar compared favourably with that produced by ether and chloroform. Dr. Goldman said that in his hands the administration of vinyl ether by the open method had not proved a success. The extreme volatility of the drug occasioned difficulty in maintaining an even plane of anaesthesia for long cases. For minor surgery he preferred a closed method, and when this was employed for dental work in children he was of the opinion that the results compared most favourably with those obtained with nitrous oxide. For major operations the closed system combining carbon dioxide absorption was the method of choice, and he recommended that the soda-lime canister should be fitted close to the facepiece. Nitrous oxide and oxygen could be bubbled through a small bottle containing 25 c.cm. of vinyl ether and attached to one of the usual forms of gas-oxygen apparatus. There was no contraindication to the use of a basal anaesthetic with vinyl ether, and as an adjuvant to gas and oxygen it had many uses, particularly in order to obtain additional muscular relaxation during an abdominal operation. Dr. Goldman demonstrated his methods with a cinematographic film showing the use of vinyl ether in dental surgery.

Dr. MARY MAYEUR referred to her experiences with vinyl ether in 348 obstetrical cases. The agent was given either by the open method, when it was dissolved in ethyl ether in the proportion of one to three and administered on an open mask of thin gauze, or it was used as an adjunct to nitrous oxide and oxygen. No maternal deaths were observed in the series, no patient stopped breathing or gave cause for any anxiety, and no remote toxic effects were seen. The series included seventeen patients with valvular lesions of the heart, twenty-nine showing signs of severe toxaemia, and two diabetics. Anaesthesia was induced with vinyl ether and oxygen, and in two to three minutes sufficient relaxation was obtained for the obstetrician to insert a hand and perform the desired manipulations. During traction with forceps anaesthesia could be maintained with nitrous oxide, but it was wise to add vinyl ether when the perineum was distended. The action of this drug in not diminishing uterine contractions indicated its suitability as an anaesthetic in the presence of complications in the third stage of labour, but it was not found satisfactory for external rotation where complete relaxation of the abdominal muscles and of the uterus itself were essential. It seemed to combine the advantages of chloroform—namely, rapidity of induction and absence of irritation of the respiratory tract with an undiminished uterine action and a greater margin of safety for the patient.

Dr. G. E. NESBITT (East London, South Africa) inquired the time taken for induction and the period of anaesthesia obtained when vinyl ether was administered by the one-dose method. Dr. JARMAN believed that for obstetrical work nitrous oxide and oxygen was superior to vinyl ether. Anaesthesia could be deepened by the use of an intravenous barbiturate. Dr. OVERTON asked for guidance in the choice of suitable cases for anaesthesia with vinyl ether in major surgery. Dr. LLOYD-WILLIAMS said she was convinced of the value of vinyl ether in obstetrical work.

In reply Dr. GOLDMAN stated that vinyl ether could not replace nitrous oxide and oxygen when this was given by an experienced administrator equipped with adequate apparatus. So far as major surgery was concerned he felt that it should be used only by the anaesthetic specialist. With the single-dose method the induction time was about fifty-five seconds, and the duration of anaesthesia was in the region of one minute.

SECTION OF ANATOMY, PHYSIOLOGY, AND BIOCHEMISTRY

Friday, July 23

Visceral Pain

With Professor HENRY BARCROFT (Belfast), a Vice-President, in the chair, a discussion on visceral pain was opened by Professor JOHN MORLEY (Manchester). The characteristics of pure visceral pain such as originated in the gastro-intestinal tract were that the only adequate stimulus was tension on the afferent nerve endings, that

its localization was vague, and that it was not referred to the surface of the body. On the other hand, pain that was strictly localized and associated with muscular rigidity and tenderness was of somatic origin, and resulted from stimulation of the nerves of the parietal peritoneum. An example was the shoulder-tip pain produced by stimulation of the phrenic nerve terminals below the diaphragm. The mechanism of this pain would seem to be adequately explained by the observations of Barron and Matthews that afferent impulses from the peritoneum entering the posterior root at one segment could be discharged to the periphery at a different segment along collateral fibres. Such "peritoneo-cutaneous radiation" was an example of "referred pain." Testicular pain in renal or ureteric colic and urethral pain due to stimulation of the trigone of the bladder were of this type.

Professor B. A. MCSWINEY described experiments on cats that had enabled his colleagues and himself to trace the distribution of visceral afferent fibres in the vagus and splanchnic nerves. The mesenteries of the stomach, duodenum, and ileum were sensitive to traction, and the small intestine was much less sensitive to distension than the stomach and duodenum. There was a very wide segmental distribution of the afferent fibres from any one part of the gastro-intestinal tract. Visceromotor reflexes could be demonstrated by recording action potentials in the rectus abdominis by stimulation of the splanchnics or the peritoneum, traction on the mesenteries, or distension of the pyloric antrum. Painful distension of the stomach or duodenum caused constriction of the finger vessels in man. Referred pain obtained on stimulation of the phrenic nerve was also discussed.

Dr. E. P. POULTON believed that referred pain could come from visceral stimulation, and cited angina and development of a painful spot on the back produced by oesophageal distension. He referred to "reflex" pain such as occurred in the stomach in appendicitis. He discussed experiments performed by Payne and himself on oesophageal distension. The pain thus produced was relieved by the passage of a peristaltic wave, which caused contraction of the muscular walls and therefore relief of the tension on the nerve endings. Successful peristalsis was painless, but a peristaltic wave which failed to overcome an obstruction did not relieve the tension on the nerve endings, and was therefore painful.

Professor J. R. LEARMONTH (Aberdeen) said that the surgeon might be called upon to attempt to relieve visceral pain of two types: (*a*) that accompanying disordered function, and (*b*) pain of a possibly "neuralgic" type. The surgeon was hampered by the lack of intraneural topography in visceral nerves, so that it was impossible to perform neurectomy close to a viscus without disturbing its function. The further from the viscus the more the viscerosensory fibres diverged; and in order to interrupt these diverging sympathetic pathways very extensive operations would be necessary. The speaker illustrated this point by a series of anatomical diagrams. Of available operations there were: division of the superior hypogastric nerve for pain originating in certain pelvic viscera; stripping of the renal pedicle for painful hydronephrosis; division of the thoracic splanchnic nerves for pain in upper abdominal viscera; section or injection of rami communicantes for abdominal and cardiac pain; and cordotomy.

Professor BARCROFT mentioned an observation of Dr. G. W. Theobald that labour pains could be abolished by infiltration of the twelfth dorsal and first lumbar nerves. Professor MORLEY said that the Manchester school had failed to confirm this observation. Professor A. B. APPLETON suggested that the vague localization of true visceral pain referred to by Professor Morley might be due to the wide segmental distribution of the afferent nerves.

Professor MORLEY, in his reply, said that the real field for the investigation of visceral pain was the human body, and that it was difficult accurately to detect pain in animals. Professor McSwiney had described visceromotor reflexes from the pylorus, but the speaker had yet to see evidence in abdominal disease of viscerosomatic reflexes occurring as the result of painful stimulation of abdominal viscera. In regard to Dr. Poulton's experiments, he wondered how far the oesophageal tension might stimulate adjacent somatic nerves and thus produce the referred pain.

Afferent Nerve Supply of Arteries

Dr. J. DIXON BOYD (Cambridge) read a paper on the afferent nerve supply of arteries, with special reference to pressor-receptors. Approaching the subject from the embryological aspect, he traced the development of the branchial arch arterial system and its afferent nerve supply. He suggested that the sudden closure of the ductus arteriosus at birth was maintained by the pressor-receptor nerve fibres with which its walls were plentifully supplied. It was possible that the cells of the carotid body were chemoreceptor and sensitive to changes in the blood composition of the respiratory gases. Similar collections of epithelioid cells were to be found in the neighbourhood of the arch of the aorta, the ductus arteriosus, and the pulmonary artery, the last-named being sensitive to changes in the composition of the venous blood.

Vascular Reactions of the Kidney

Dr. D. H. SMYTH (Göttingen and Belfast) read a paper on vascular reactions of the kidney in response to carotid sinus and other reflexes. It was found that the kidney possessed an automatic mechanism of vascular control and that its blood flow remained relatively unaffected by general vascular reflexes designed to redistribute the blood supply of the body as a whole, such as could be initiated by stimulation of the carotid sinus, clamping the carotid arteries or aorta above the renal arteries, or the administration of adrenaline. The response of the renal blood flow to these manœuvres was very slight, and was unaffected by denervation of the kidney.

Dr. J. S. LOUGHRIDGE (Belfast) asked if the effect of pituitrin on the blood flow through the kidney had been investigated, and Dr. SMYTH replied that he had not done so. Professor BARCROFT asked if there was any evidence as to the function of the cells of the carotid body. Dr. BOYD replied that the nerve endings in the carotid body appeared to be sensory, but the cells themselves seemed to be secretory, and suggested that the carotid body might bear the same relation to a parasympathetic ganglion as the adrenal medulla bore to a sympathetic ganglion. He pointed out that one would expect such vital organs as the brain, the heart, and the kidney to be independent of the general vascular reflexes of the body, and in response to his question Dr. SMYTH stated that the renal experiments had been repeated on the coronary vessels with similar results.

Chemical Mediators in Nervous Activity

Professor T. H. MILROY (Edinburgh) read a paper on chemical mediators in nervous activity, in which he dealt with the electrolytic changes that took place at phase boundaries such as might be caused by the liberation of acetylcholine at a synaptic junction. Acetylcholine was actually adsorbed on to the membrane and altered the change of the electrostatically fixed layer, where it acted as a cation by neutralizing some of the electronegative ions. The potential at the phase boundary was therefore altered, and this gave rise to the action currents, which could be demonstrated.

Physiology and Biochemistry of Diseases of Muscle

Dr. S. NEVIN read a paper on the applications of advances in physiology and biochemistry to the study of diseases of muscle. He confined himself to a description of electromyographic studies of cases of myotonia, con-

sisting of action current records and pressure tracings from balloons held in the hand and placed over the muscles of the forearm. The clinical features of myotonia consisted of a pathological delay in relaxation of muscles after voluntary contraction, seen particularly in hand-grasping, and aggravated by cold and relieved by warmth. The electrical records showed an outburst of high-frequency action current discharges, both in the flexors and in the extensors, during the period of relaxation. It would appear that there was an increased sensitivity of the end-plate, leading to abnormal resumption of postural tonic impulses.

SECTION OF DISEASES OF CHILDREN

Friday, July 23

Enuresis

With Dr. ROBERT MARSHALL (Belfast), Vice-President, in the chair, a discussion on "enuresis" was opened by Dr. ROBERT HUTCHISON, whose paper was published in the *Journal* of July 31 (p. 206).

Dr. STANLEY GRAHAM (Glasgow), dealing with biochemical considerations, pointed out that the exclusion of organic disease was of great importance, since enuresis might be a symptom of a pyogenic infection of the urinary tract. Pus cells seen in a drop of uncentrifugalized urine and the growth of organisms in culture indicated the diagnosis. When enuresis began for the first time about the age of 4 or 5 years, especially in girls, a pyogenic infection was found in the majority of cases. Adequate treatment of such infection along modern lines yielded satisfactory results, and the question of some congenital malformation of the urinary tract had to be considered if such treatment failed. Chronic interstitial nephritis or renal dwarfism, continued Dr. Graham, was another condition in which bed-wetting might be a leading symptom, usually associated with thirst. Evidence of renal failure was obtained in such cases by examination of the blood for nitrogen retention. Dr. Graham also mentioned diabetes mellitus and diabetes insipidus as causes of enuresis. He was not convinced that spina bifida occulta was a cause of enuresis, but stone in the bladder and acute nephritis had certainly to be considered. As regards treatment, when organic disease had been excluded Dr. Graham thought that the greatest hope lay in the development of psychological measures.

The CHAIRMAN asked about the management of the persistent occasional enuretic who only had a wet bed now and then. He wondered if such occasional lapses had anything in common with the occasional-fit type of epilepsy. He thought that mothers of enuretic children were either too fussy or too careless. Dr. H. MORLEY FLETCHER (President) stressed the importance of early training of infants in control of the bladder, stating that a child of 1 year old ought to be dry by day. No cure of nocturnal enuresis was possible until a child was controlling his bladder properly in the daytime. He also mentioned the type of nocturnal incontinence which developed at puberty, and the occurrence of enuresis after one of the acute specific fevers.

Dr. E. A. BENNET emphasized the psychological aspect of the subject, stating that it was very important to consider the parents and the whole environmental situation of the child. He said that an enuretic child must be made to take the responsibility for the condition, and he had found it useful for such a child to keep a diary of his progress under treatment. Dr. R. E. STEEN (Dublin) agreed as to the importance of the psychological aspect of the subject. The child required help and not blame for its condition. He mentioned the importance of cutting down the food intake as well as the fluid in the second part of the day. Dr. W. R. F. COLLIS (Dublin) was also glad that the psychological aspect had been stressed. In the majority of cases of enuresis he thought there was some conflict in the home. Professor SEYMOUR BARLING (Birmingham) stressed the complicated nature of the function of micturition and the necessity for careful training in the transition stage, when control of the bladder was being gained.

Dr. KATHLEEN MCKEOWN asked about the child coming from a poor home who had received no sort of training at all. The enuresis was sometimes discovered for the first time only when the question of a convalescent home was raised. She asked how long psychological treatment might be expected to take. Dr. T. H. CROZIER (Belfast) agreed that the greatest difficulty was often seen with the hospital patient who shared a bed with several others. Dr. D. C. R. R. JENKINS (Belfast) spoke of his difficulties as medical officer of a public school, particularly when boys wet the bed there and not at home. He had noticed excessive acidity of the urine in some cases.

Tuberculous Cervical Adenitis

Professor BARLING, in a paper on this subject, dealt especially with the modern tendencies in the treatment of the disorder. Tuberculosis of the glands in the neck was, he said, usually a focal infection originating in the oral and nasal tissues, the tonsil being by far the most frequent source of such infection. The disease was uncommon under 2 years of age, and the majority occurred in childhood and adolescence. He thought the disease essentially resulted from low dosage and limited local infection. Diagnosis was often difficult in the early stages, and might account for fallacies as to the efficacy of non-operative measures of treatment. In early cases treatment by the mercury-vapour lamp was to be recommended, especially in the younger patients with a recent infection. Surgical excision was indicated if there was any extensive breaking down of the involved glands, and also if discrete glands or masses of some size remained after a suitable course of non-operative treatment. Professor Barling emphasized, in conclusion, that operations in tuberculous adenitis called for surgery of a high order. Dr. HUTCHISON said that as a physician he saw such cases, and he was struck by the extreme frequency of the association with septic tonsils. He thought that the use of sunlight and other measures were uncertain and time-consuming compared with surgical excision. Professor JOHN MORLEY (Manchester) agreed that the reaction against surgical procedures had probably gone too far.

Thyroid for Premature Babies

Dr. ALAN MONCRIEFF explained that the method of stimulating premature babies by means of thyroid extract had been introduced by Dr. Eric Pritchard, although clearly deriving from the classical experiments of speeding up the development of tadpoles by use of this substance. He gave the results of a controlled experiment at Queen Charlotte's Hospital by which it was shown that the mortality rate among premature babies not receiving thyroid was over three times that among such babies who were given 1/20 grain of thyroid extract daily per pound of body weight during the early days of life. Dr. COLLIS confirmed the value of this method, and mentioned its use in preventing low temperatures in premature babies.

SECTION OF NUTRITION

Friday, July 23

Physiological Bases and Standards

With the President, Sir ROBERT MCCARRISON, in the chair, Professor STUART J. COWELL opened a discussion on the physiological bases and standards of nutrition.

Professor Cowell said that although with further advances in knowledge most of the diseased states now recognized might be definable in terms of definite disturbances of metabolism or nutrition, it would be convenient to limit the sphere of the discussion to those nutritional processes which are known to be more or less

directly related to the intake or absorption of food. He would confine his observations, as the report of the Health Department of the League of Nations had done, to practical questions such as what we could hope to accomplish by dietary recommendations and what diets were most likely to secure the desired effect. The experience of most of those engaged in controlled feeding experiments with laboratory animals had been that diets which promoted the most rapid growth in early life maintained the animals in the most vigorous health in adult life. The question of the maintenance of a state of health and full vigour was becoming more and more widely recognized as one in which right feeding must occupy a prominent position. Frank deficiency diseases due to a low intake of mineral elements and vitamins, and possibly of good protein, were by no means rarities in the British Isles. How far minor degrees of specific deficiencies were responsible for lessened vigour and vitality and lowered resistance to infections and degenerative diseases was a matter of conjecture, but steps were being taken to fill in this gap in our knowledge. Professor Cowell declared that it should be possible to reduce enormously the amount of dental decay in the next generation by securing as perfect a state of nutrition from the pre-natal period onwards as existing knowledge would permit. He regretted the tendency in some quarters to assume that an adequate supply of essential food constituents was that which prevented the appearance of gross signs of deficiency diseases, whereas there was evidence that improved states of nutrition could be secured by increasing the intake to a liberal extent above the protective level. The practical steps he recommended were the provision for everyone of liberal quantities of the protective foods. This could most easily be achieved by increasing the consumption of safe milk and dairy products, green vegetables, eggs, fat fish, and liver, with a corresponding decrease in the consumption of refined sugar and cereals. The essence of the scheme for securing good nutrition in children was insistence on a high proportion of the protective foods. Between the ages of 1 and 3 three-quarters of the calories should be obtained from protective foods, and between the ages of 3 and 7 about two-thirds.

Dr. HELEN M. M. MACKAY dealt with standards of iron nutrition, considering iron deficiency as an example of a condition in which departures from normal were measurable as a result of the establishment of normal standards of haemoglobin level for the adult and for the young child. She pointed out that the existence of these standards had brought to light the fact that iron deficiency was perhaps one of the most widespread deficiencies in human diets. She made a plea for the earlier introduction of mixed feeding in infant work.

Dr. J. F. BROCK (Cambridge) dealt with the question of those people for whom average dietary standards were not adequate. He reviewed the various mechanisms by which disorders of the gastro-intestinal tract could condition deficiency disease in people whose dietary intake was inadequate by ordinary standards. Some of these disorders were apparent at once, but of greater interest were those in which there were no symptoms of gastro-intestinal disorder and the general state of nutrition of the patient was good. He instanced Addisonian anaemia as an example, and stated that recent research suggested that silent disorders of the stomach and intestine were commoner than had been apparent in the past. He referred to examples of interference by one dietary constituent with the absorption of another, and suggested that the remedy was to insist that supplements of concentrated or synthetic vitamins or of medicinal preparations of mineral elements should always be an addition to and not a substitute for a diet which was adequate in every respect in dietary constituents derived from natural foods. He reinforced the opener's plea for liberal rather than minimum nutritional standards.

Dr. J. C. SPENCE (Newcastle-upon-Tyne) quoted instances to support the thesis that conditioned deficiency disease was very common in the practice of medicine. He stressed the importance of individual variation in dietary requirement. Important sources of deficiency states were latent steatorrhoea and gastro-enterostomy. The physiology of appetite had been very imperfectly studied.

Professor W. R. FEARON (Dublin) read a paper on the metallic microconstituents of a modern diet. He said that the number of microconstituents necessary for life was between 40 and 60. He outlined the role of certain of them, especially copper, zinc, and cobalt. Cobalt deficiency disorders had recently been described in Australian sheep. He dealt with the marked differences between brown and white bread in respect to the content of microconstituents.

A paper on the detection of malnutrition, by Dr. W. R. AYKROYD (Coonor, India), was read for him by Professor D. C. HARRISON. His remarks were concerned with the state of nutrition of children in Southern India, where the diet was almost universally defective by Western standards. Marked differences between height and physique as between rice-eating and tapioca-eating communities could be related to diet rather than to race. The incidence of angular stomatitis, xerophthalmia, and follicular keratosis, together with certain anthropometric measurements, had been related to states of nutrition.

Food Intakes and Requirements

Dr. R. A. MCCANCE read a short paper on food intakes and food requirements. Minimum requirements could be fairly accurately estimated, but the margin between that and optimum requirements always varied with the judgement of the observer. He pointed out certain fallacies in the method of calculating family requirements and intakes and their reduction to man-value equivalents, and recommended the measurement of individual food intakes. Professor W. A. OSBORNE (Melbourne, Victoria) pointed out the cheapness of food in Australia. Milk, however, was scarce in the metropolitan areas, and green vegetables scarce in the areas of low rainfall. Although the evidence that malnutrition led to imperfect teeth was incontrovertible, the reverse assumption that imperfect teeth were due to malnutrition was false. Dr. J. H. STRAHAN (Singapore) had found caloric man values well below 2,000 in certain parts of Malaya. Vitamin deficiencies were commonly encountered. Dr. LUCY WILLS had found that B_1 deficiency became manifest in her animals when the metabolism was increased by the rectification of other deficiencies. Dr. S. MILLER (Harrogate) said that by persistent iron therapy he had been able to raise the haemoglobins above the usually accepted normal levels.

SECTION OF OPHTHALMOLOGY

Friday, July 23

Affections of the Eye with Relation to Skin Diseases

With the President, Mr. J. A. CRAIG (Belfast), and subsequently Mr. J. D. M. CARDELL, in the chair, Mr. J. H. DOGGART and Dr. G. B. DOWLING opened a discussion on affections of the eye with relation to skin diseases.

Mr. Doggart, speaking from the ophthalmological aspect, drew attention to the great degree of overlapping between the dermatologist and the oculist on purely anatomical grounds. He said that there was, however, a deeper common interest in that ocular treatment may sometimes have to be materially modified owing to the state of the adjacent skin, and in that the eye may have to be protected from remedies applied to the upper part of the facial skin. One characteristic of the skin of the eyelids was its great tendency to oedema, as seen in inflammatory lesions and in such traumatic conditions as the "black eye." A condition of particular interest was blepharochalasis, since this represented the result of

repeated attacks of distension of the skin of the lids. A whole group of new skin irritants, particularly active in the case of the lids, had come with synthetic chemistry; some of the new compounds cause direct local irritation, others, like orris root in shampoos, excite an allergic reaction. The work of Ridley had shown the allergic nature of atropine irritation, and a point of significance was the extreme rarity of atropine intolerance in the absence of some congestive disease of the eye. Blepharitis was frequently part of a general skin condition such as seborrhoea, pityriasis, or sycosis. In the treatment of blepharitis the avoidance of chronic dermatitis in the adjacent skin was important, as otherwise a vicious circle was apt to be set up. Strong chemicals were to be deprecated in the treatment of blepharitis. Mr. Doggart referred to the encouraging results that had been obtained in styes by the use of autogenous vaccines, but in many cases no local infection or existing cause can be established. Corneal lesions had to be regarded as lesions in ectodermal tissues which share the susceptibility of the skin to certain infections and dystrophies. Myxoedema, measles, pemphigus, and dermatitis herpetiformis all illustrate that tendency, whilst the corneal lesion of acne rosacea illustrated a type that was well ground into the consciousness of ophthalmologists. Rosacea keratitis, in particular, was the type of lesion that had to be treated on general lines, and too energetic local treatment avoided.

Dr. DOWLING, speaking as a dermatologist, said that rosacea was to be regarded primarily as a vascular disturbance, becoming troublesome later in life. Gastric disorders were contributory factors only, whilst the menopause with its vasomotor disturbances was not to be ignored. Ocular complications appeared most commonly in the constitutional hereditary type of vasomotor rosacea, and infection played little or no part in it. Drawing a distinction between seborrhoea and dandruff, he classified blepharitis as seborrhoeic and as the result of sycosis of the eyelashes; the first might be complicated by infection, whilst the second was frankly infective. Dermatitis of the eyelids had also a multiple aetiology; infection, chemical irritation, and seborrhoea, in addition to unknown factors, were to be considered in this affection, which begins with an acute attack and tends to become chronic. Rubbing to allay irritation aggravates the condition, and local treatment was difficult. Turning to less common conditions, he discussed lupus, basal-celled epithelioma, pemphigus, warts, and xanthelasma in their bearing on ophthalmology.

In the discussion that followed Mr. J. D. M. CARDELL referred to the gravity of lid involvement in leprosy, a view which was not shared by Lieut.-Colonel R. E. WRIGHT, who emphasized the seriousness of herpes ophthalmicus. Mr. G. G. PENMAN drew attention to the danger of corneal perforation in rosacea keratitis. Mr. R. AFFLECK GREEVES regarded some forms of blepharitis as symptomatic of infection of the meibomian glands. Such infection was also taken as a factor in rosacea keratitis by Mr. E. J. PRIMROSE (Glasgow). Dr. H. MACCORMAC emphasized gastro-intestinal dysfunction rather than vasomotor distubances in rosacea.

Glaucoma Secondary to Injury

Mr. R. AFFLECK GREEVES read a paper on some unusual cases of glaucoma secondary to injury. He cited four cases, in two of which glaucoma developed after a non-perforating injury; in none of them were any of the usual causes of secondary glaucoma present. In the first case the eye was trephined, the operation being followed by papilloedema and ultimate peripheral constriction of the field, with retinal vascular changes but permanent normal intra-ocular tension. In the last two cases glaucoma developed as the result of the retention of an intra-ocular foreign body, the existence of which had been unsuspected by the patients themselves. In the first case the foreign body proved to be magnetic, and after its removal by operation the tension remained normal. In the second case the foreign body was non-magnetic, and its removal was not possible. By means of a trephining operation normal intra-ocular tension was obtained, the foreign body remaining *in situ*.

The possible aetiology of the glaucoma in these cases was discussed by the PRESIDENT, Mr. CARDELL, and Mr. W. B. INGLIS POLLOCK (Glasgow).

Corneal Transplantation in an Aphakic Eye

Mr. J. V. MCAREVEY (Dublin) followed with a paper on corneal transplantation in an aphakic eye. After pointing out the value of infra-red photography for examining the state of the pupil, the presence of anterior synechiae and the existence of defects in the iris, and stressing the help that could be obtained from double transillumination with the slit-lamp, he gave an account of a patient with bilateral leucoma and cataract on whom he had performed keratoplasty. In the case of the first eye the graft, which had been clear, became opaque; later, tension developed, the graft burst open, and the opaque lens became extruded, ultimately leaving perception of light only. When operating on the second eye the graft was placed eccentrically so as to avoid synechia. The result was better than with the first eye, though the initial conditions had been less promising. The speaker thought it was best not to attempt cataract extraction at the time the corneal grafting was done.

The PRESIDENT congratulated Mr. McArevey on his successful use of infra-red photography, and Lieut.-Colonel WRIGHT discussed the significance of slit-lamp examination, as well as points in the technique of the operation.

Colour of the Optic Disk

Mr. EUGENE WOLFF, in a paper on the colour of the optic disk, drew attention to the great number of small vessels normally present at the nerve head. This helped to explain not only the normal colour but the presence of oedema at the disk in such lesions as renal retinitis. The temporal part of the disk contained a thinner layer of nerve fibres and fewer capillaries than the nasal part. This accounted for the normally whiter appearance of the outer half of the disk, and for the relatively ill-defined nasal edge. Nerve fibres are crowded together most at the disk edge of the upper and lower inner quadrants, a fact which explained the localization of the first signs of swelling of the disk. The white element in the colour of the disk was due to the lamina cribosa and to the medullated nerve fibres behind it. The whiteness becomes exaggerated in primary optic atrophy owing to the disappearance of capillaries and nerve fibres obscuring the lamina cribrosa. The white colour is less marked normally in the baby, and in the newborn the disk appears grey. Two factors entered into this modification: myelination of the optic nerve fibres (with the white appearance it carries) does not reach the lamina cribrosa till after birth, and the lamina itself is almost transparent at birth, becoming more opaque and white with time. The paper was illustrated with histological preparations and photomicrographs.

SECTION OF ORTHOPAEDICS

Friday, July 23

Treatment of Club-foot

With the President, Mr. S. T. IRWIN, in the chair, Mr. DENIS BROWNE opened a discussion on modern methods of treatment of club-foot. The speaker gave a brief account of the observations that had led to the formulation of his theory, the revival of one put forward centuries ago, that club-foot and many other congenital deformities such as spina bifida and arthrogryposis multiplexa congenita were the result of increased intrauterine pressure. Most convincing photographs of newborn children showed how these deformities might easily have been produced *in utero*, the chief pressure points being revealed by deep

and permanent dimpling of the skin. Treatment of the early case consisted in vigorous manipulation of the feet and the application of the splints designed by the speaker.

Mr. E. P. BROCKMAN concerned himself chiefly with treatment. He had abandoned strapping and plaster-of-Paris in favour of the Denis Browne splint, and was certain that his results were now better than formerly. The great advantage of the splint was that it allowed the child to use the leg muscles; not only did this prevent atrophy but the child corrected the equinus deformity by kicking, the forefoot alone meeting the resistance of the splint. Yet in spite of thoroughly efficient early treatment a number of cases remained incompletely corrected, or relapsed after apparently successful correction. For these, open division of the soft parts on the medial side of the tarsus (methods described by Ober, Elmslie, and Brockman) was recommended. Unfortunately this procedure was often followed by relapse. In the end a bone operation might be required, and a triple arthrodesis on the lines suggested by Lambrinudi was probably the best of these last-resort methods.

Mr. T. P. MCMURRAY (Liverpool) maintained that early, thorough, and prolonged treatment would almost always yield satisfactory results. If "over-correction" could be obtained, so that the child could easily hold its foot in a position of calcaneo-valgus, then relapse need not be feared. The stiffness and atrophy following fixation in plaster were not permanent, and there was nothing against the use of plaster if properly applied. In badly treated cases, where manipulation failed to give complete correction, open operation was necessary; but inasmuch as the deformity was bony, the soft-tissue operation could not be expected, as Mr. Brockman had admitted, to give a reasonable prospect of permanent correction, and some form of bone resection would be required sooner or later.

Mr. R. C. ELMSLIE congratulated Mr. Denis Browne both on his ingenious theory of the origin of club-foot and on the efficacy of his splint, which was probably the greatest contribution to the treatment of club-foot during the last twenty-five years. In a way, it was a return to the methods of the nineteenth century orthopaedic surgeons, who corrected the deformity gradually with instruments such as Scarpa's shoe, and whose results were probably better than those of present-day practice. He felt sure that surgeons to-day were too impatient and too prone to resort to open corrections. There were, no doubt, cases in which open operation was inevitable, and he agreed with Mr. Brockman's views on this type of treatment. The soft-tissue operation dated from Rushton Parker and wedge tarsectomy from Walsham, both working in the last quarter of the nineteenth century. Since their time nothing beyond minor refinements had been added.

Mr. H. O. CLARKE (Manchester) had hoped that the openers would produce statistics to give clear definition to their statements. If this were really a discussion on modern treatment, it should have been possible to say how many cases would resist manipulative treatment, how frequently the soft-tissue operation was successful, and so on. The discussion was continued by Mr. ERIC LLOYD, Mr. H. F. MACAULEY (Dublin), Mr. V. J. M. TAYLOR (Nottingham), Mr. IAN FRASER (Belfast), Mr. H. J. SEDDON, and the PRESIDENT.

In reply, Mr. DENIS BROWNE said, in answer to a question, that although disturbance of intra-amniotic conditions was difficult to demonstrate, there was no doubt that abnormal enlargement of the uterus had been noted in a number of cases (hydramnios) and curious pains late in pregnancy (oligohydramnios—or perhaps increased tension in an amniotic sac of normal size) in others. A comparable condition was well known in sheep.

Treatment of Tennis Elbow

A discussion on the treatment of tennis elbow was opened by Mr. G. P. MILLS (Birmingham), whose paper appeared in the *Journal* of July 31 (p. 212).

Mr. K. H. PRIDIE (Bristol) had seen a number of cases in which a tennis elbow was only one result of persistent muscle imbalance—in other words, bad play. There was often an associated stiffness of the neck, which called for treatment just as much as the elbow. Mr. W. E. TUCKER considered that there were three varieties of tennis elbow, one due to a partial tear at the origin of the extensor carpi radialis brevior, another—difficult to cure—due to an epicondylar bursitis, and one resulting from a fibrositic deposit in the olecranon fossa. In his experience general anaesthesia was not always essential for the performance of the manipulation.

Mr. ELMSLIE was surprised that no one had considered the question of focal sepsis. He himself had suffered from a tennis elbow (as a result of manipulating club-feet!), which did not clear up until an infected wisdom tooth had been removed. Mr. D. MCVICKER (Belfast) thought that the lesion was almost always intra-articular.

Professor E. W. HEY GROVES (Bristol) had dealt chiefly with intractable cases, and most of them seemed to belong to the "muscle-tear" group. He had found it useful, as a diagnostic measure, to inject the painful area with novocain. If the pain disappeared completely the diagnosis was confirmed. For the intractable case he recommended freeing the extensor mass at its origin through a small incision. Mr. G. K. MCKEE had seen many relapses after manipulation. In these difficult cases he, too, favoured open operation, and had found on several occasions a well-defined area of oedema at the origin of the extensor muscles. Mr. F. CROOKS (Nottingham) found that nine-tenths of his cases were of the muscle-tear type, and he treated them exactly as he would any other muscle tear—namely, by rest. Two weeks was generally sufficient, followed by gradually increasing active exercise. In the PRESIDENT'S experience the injury producing a tennis elbow was often trivial and out of proportion with the disability that resulted. He believed that the lesion was essentially a tear at the origin of the extensor muscles, frequently followed by a traumatic periostitis. This explained the intractability of the pain in many cases.

Mr. MILLS, in reply, said that while some cases were undoubtedly due to a muscle tear there was no denying that the lesion must be intra-articular in most cases. How else could one explain the limitation of extension, the sensation of something being "out" in the joint, and the sudden recurrence of symptoms following an incautious movement a week or two, perhaps, after a successful manipulation?

Mr. TUCKER read a short paper on athletic injuries to the knee, excluding damaged cartilage.

SECTION OF MEDICAL SOCIOLOGY

Friday, July 23

Health Legislation in Industry

The President (Dr. THOMAS CARNWATH) said that the discussion was appropriate in view of the new Factories Act. Legislation was the framework within which the industrial life of the nation must be carried on, but it was important that it should be neither too rigid nor too elastic, and that the contribution of medical knowledge to the wider realization of a well-ordered society should not be disregarded.

Dr. L. P. LOCKHART (Nottingham), in an opening paper, said that medicine in one way or another was coming into more intimate contact with industry. The Factories Act had brought the possibility of medical supervision on a wide scale into practical affairs. The selection of staff, the training of supervisors, and the investigation of production problems had medical implications. An industrial training for doctors as a postgraduate course with practical experience was essential; merely to visit industries

was quite inadequate, and the proper training took time. In addition to a study of processes some insight into managerial functions and technique was necessary to enable the doctor to understand the problems of administration. Industry was beginning to take medicine into its counsels and give it more than a purely research and supervisory function. A step in the right direction was taken when the Representative Body at the Belfast Meeting had approved an ethical code for doctors working in industry. The Council of the Association also, in order to deal with the wider issues of social medicine, had formed a joint committee with the Trades Union Council. The Factories Act laid considerable burdens on the profession, and the necessary machinery to train and educate doctors for industrial work had to be evolved. Medicine was becoming a function of management.

The Small Factories

Mr. J. E. WILSON (Belfast) said that while many of the great industrial undertakings had their own medical service, there were about 124,000 factories in Great Britain and Northern Ireland in which fewer than 250 persons were employed, and in factories employing between 100 and 250 persons there were about 21.5 per cent. of the total number of workpeople, as against only 16.3 per cent. in factories of 1,000 and upwards. It was in this field that the need for a trained industrial medical service was urgent. He looked for a useful result in this connexion from the establishment of the new Department of Industrial Medicine by the University of Birmingham. Many of the smaller factories would welcome the opportunity to secure the part-time service and co-operation of a fully trained medical officer where a whole-time officer would not be justifiable, and such a man could supervise several small factories. Mr. Wilson mentioned that the first reference he could find to a works doctor was in 1830, when a worsted spinner advised that a medical officer should visit his works daily and watch the effect of the work on the children's health. There were also records of a John Smith of Deanston, near Stirling, who in 1842 retained the services of a "medical gentleman" to inspect the workpeople from time to time. More than fifty years later the various voluntary efforts were recognized by the appointment of Dr. Thomas Legge as the first medical inspector of the Home Office.

A Co-ordinated Service

Mr. ERNEST BEVIN (chairman, Trades Union General Council) said that with the passing of the Factories Act and the placing of the industrial health problem on a more organized basis an opportunity presented itself for a really co-ordinated service which for the first time could be made universal in its application. It had been assumed for a long time that the main thing to be looked for in a case of illness was whether or not the worker was a malingerer. Practically the whole of the laws relating to workmen's compensation and the restrictions associated with certain health services had been based on the supposed necessity for protection against exploitation on the part of the worker. Happily, with the growth of the study of psychology and a deeper understanding of the industrial health problem, this approach to the subject had been changed. Another difficulty was the attitude of the people themselves to the works doctor, who was looked upon as a person employed by the management to protect its interests. Mr. Bevin was hopeful that before long the new joint committee of the B.M.A. and the T.U.C. would examine the whole problem with a view to ascertaining the best possible way of establishing, not a new segregated, but a co-ordinated medical service, with a comprehensive research organization. Taking the great hospitals as centres, what he desired to see was an experiment whereby twenty or thirty insurance practitioners might pool the whole of their insured patients, the State or public authorities providing the necessary building accommodation and equipment for the setting up of a special clinic. Each of those participating, whilst continuing as a general practitioner, would have the opportunity to specialize on some phase of industrial medical work, and works doctors would take part in the work of the clinic, acting as part of the general practitioner service. There should be close contact between such clinics and the hospitals and research institutions, and every possible facility should be given for the carrying out of such work.

Dr. R. E. LANE (Salford), after citing the electric accumulator industry during the last twenty years as affording a concrete example of what could be done to safeguard health in a dangerous industry, spoke of the need for the availability of expert medical advice for the employer on request. Where experimental work was necessary resort might now be had to London or Birmingham University, where a Department of Industrial Hygiene had been opened. In other instances the problem might be investigated by the Industrial Health Research Board.

Irish Experience

Major GRAHAM SHILLINGTON (Minister of Labour) and Mr. J. M. ANDREWS (Minister of Finance) made a few complimentary remarks, the former saying that in social legislation Northern Ireland endeavoured to keep on parallel lines with Great Britain.

Mr. W. J. MCCAGHEY (Chief Inspector of Factories, Northern Ireland) spoke of the great improvement in factory conditions which had taken place during the forty years of his own experience. In the linen industry the ventilating and humidifying plants in most of the factories had recently been completely renewed or overhauled. The small, struggling employer presented the real problem, but he must not be permitted to retard progress. Improved conditions of work were becoming more urgently necessary because of the increasing monotony and continual speeding up in these days of mass production and mechanization. It was common ground that many occupations had injurious effects on the physical condition of those engaged in them. The employer and his managing staff could not be expected to detect signs of physical trouble among the workers. Only a trained medical man could do this, and it was therefore vitally important that the medical profession should become more acquainted with occupational diseases. The factory inspector would always welcome the works doctor and regard him as a collaborator.

Economic Considerations

Sir FRANCIS FREMANTLE, M.P., said that the real difficulty was the small business. How could a Belfast employer whose handkerchiefs cost 1s. 4d. a dozen to make compete with Japanese imports at 7½d. a dozen, still less spend money on improving his buildings or conditions of labour? Industry was also up against the appalling prospect of a declining population, with an increasing number of aged persons to be supported. The main hope was not through standardized legislation, sympathetically administered as it was by the able inspectorate of the Home Office, but by the drawing together of employers and employed and of their organizations. In this task the medical profession must play a leading part. The medical student, however, was not trained for this purpose; he was trained for the treatment of disease and not its avoidance in the individual or in the mass. A fundamental reform of medical education, based on the application of physiology to the individual and national life at large, was essential for the future of industrial health. Mr. MCADAM ECCLES said that he felt history had been made in that Section. He mentioned particularly the new conditions to which the introduction of the petrol engine had given rise. In this field both accident and disease might be dependent upon strain, and a continuance of both mental and physical fitness was essential for their avoidance. It was for the medical profession to realize the causes, effects, and methods of prevention and alleviation of strain, and particularly to diagnose strain in the early stages.

Disabilities Industrial and Non-industrial

Dr. J. F. BRAILSFORD (Birmingham) referred to the difficulty of establishing the effect which industry had had in the causation of a particular disability. Often it happened that disability did not arise until years after the first exposure to risk. He frequently came upon isolated cases in which the condition, although giving rise to suspicion, could not be fastened upon any industry. A marble worker, for example, might be found to have fibrosis of the lungs, and yet it was very difficult to establish industrial silicosis as a factor.

Dr. LEONARD KIDD (Enniskillen) mentioned that Northern Ireland was in the rather unenviable position of being the only self-governing Dominion which had not a Ministry of Health. He failed to see how full justice could be done to the workers without such a Ministry. Dr. H. C. SMITH (London) said that among his insured patients were a number of garage employees, and over a period of eighteen months or two years he had seen fit and healthy young fellows become gradually more neurotic and get gastric and other troubles "which should belong to men of seventy." Some of these men feared that if they "went sick" they would possibly lose their jobs, even though they had been working on them for fifteen or twenty years, and this fear reacted prejudicially on their condition.

Dr. H. E. COLLIER (Reader in Industrial Hygiene, Birmingham University) pointed out that the one purpose of industrial hygiene and medicine was to study the industrial factor in the production of disease and the creation of health. The Department at Birmingham with which he was associated hoped to be able to play a part in the industrial medical education of that large body of medical men and women who were urgently needed to-day to help to recognize the industrial factor in health and disease. Many types of practitioners would be required for the new health service for industry. A few whole-time specialists would be necessary, as well as a large number of part-time industrial medical men and women, but there must also be a much larger number of general practitioners working in industrial areas and possessed of an accurate knowledge of the conditions obtaining therein. Such practitioners would be able to recognize deviations from health and take part in industrial medical research.

Colonel A. B. MITCHELL stressed the need for impartiality in the medical examiner called upon to pronounce on industrial disease. In his own experience as an examiner he could not recall an employer who had ever expected him to give an opinion other than the one he had honestly formed. Dr. J. S. MORROW (Belfast) mentioned the difficulty of ensuring that workmen took ordinary hygienic measures—for example, in the case of plumbers working with lead, that they washed their hands before taking a meal. Dr. W. PATERSON (Willesden) agreed with Mr. Bevin as to the necessity for sympathy in examining an employee or candidate for employment. In the factory in which he was a medical officer he was on such good terms with the men that he could ask them such questions as what time they went to bed and whether their wives were good cooks. He never rejected a candidate right away, always suggesting to him that if he saw his doctor and received treatment he might be fit for the job for which he was applying. He welcomed the new provision whereby young people under 16 would come into national health insurance. There had been a tendency for young persons of that age to forego a visit to the doctor because they knew that if they waited until they were insured they could get the doctor's services for nothing. These young people ought to be got into the habit of consulting their family doctor on every occasion. The doctor who laughed at a person who came along with a trivial ailment did not know his job. Municipal clinics did excellent work, but they did tend to break the habit of going to the family doctor. The insurance practitioner ought to be the medical officer for the smaller factories, though he might not have an official appointment.

Replies to Discussion

Dr. LOCKHART, in reply, said that industrial doctors did not want to remain in isolation. When there came a chance of joining in with other people no one would be more willing than they. Mr. BEVIN said that there need be no fear that an industrial medical service was going to ruin industry. That was contrary to the experience of all industrial history. One of the great difficulties in getting the insurance practitioner into part-time industrial service was the fear of other insurance practitioners that he would steal their patients. The only way to get over it was by co-operation, and the medical profession had grown up on individualism. The B.M.A. would fight against a rigid State medical service, but if it did not want such a service it must offer co-operation somewhere. Accordingly he had projected this idea of a clinic which could take in the small factories in the district and pool the medical resources. What he wanted to see was a complete medical service which would avoid the rigidity of a legislative scheme and at the same time furnish all the benefits of co-operative effort. In a final remark about the London bus dispute Mr. Bevin mentioned that he was inclined to think that foot trouble might have an unlooked-for importance in the health of the drivers. The ball of the foot was constantly experiencing the vibration of the accelerator, and the foot might be used for dropping the clutch as often as 1,800 times in a seven-hour shift. He believed that this constant use of the foot affected the nervous system in a disadvantageous way. At any rate it was a matter for medical investigation. The posture in the driver's seat, causing a contraction of the stomach, might also account for not a few troubles.

SECTION OF HYGIENE AND PUBLIC HEALTH

Friday, July 23

Operative Treatment of Laryngeal Diphtheria

With Professor W. J. WILSON, President of the Section, in the chair, subsequently occupied by Dr. E. H. T. NASH, a discussion on the operative treatment of laryngeal diphtheria was opened by Dr. A. GARDNER ROBB (Belfast), whose paper was published in the *Journal* of August 7 (p. 264).

He was followed by Dr. J. M. KENNEDY (Sheffield), who discussed briefly the results which had been obtained in Lodge Moor Hospital, Sheffield, over a period of fifteen years. He gave comparative figures of total admissions, gross diphtheria mortality, and operative rate, and indicated the frequency of and the results following tracheotomy and intubation. A comparison of end-results seemed favourable to tracheotomy. Out of 10,372 patients admitted there were 327 deaths, a mortality of 3.15. Tracheotomy was performed on 352 cases and there were eighty-three deaths, a mortality of 23.57 per cent.

Dr. J. D. ROLLESTON outlined the history of operative treatment, and considered at some length the prognostic significance of serum reactions. His attitude towards serum administration was conservative; he had "never yet seen a case of diphtheria recover after intravenous serum which would not have recovered after intramuscular injections."

Dr. W. G. WILLOUGHBY (Eastbourne) presented the experience of a small community over a period of many years. He quoted figures from Vienna which showed good results following intubation alone. He reported also a case in which death immediately followed the injection of evipan in a case of diphtheria.

Professor J. JOHNSTONE JERVIS (Leeds) asked about the type of *C. diphtheriae* responsible for infection. Their

experience in Leeds was that no case of laryngeal diphtheria was caused by the "gravis" strain; in all such cases the "mitis" strain was found.

Dr. J. McI. GIBSON (Huddersfield) reported the continuance of gravis infection around Huddersfield, with very few cases of laryngeal involvement but two definite cases which were proved to be due to gravis strains. Dr. GARDNER ROBB closed the discussion, still maintaining the advantages of intubation.

Bragg-Paul Pulsator

Dr. C. J. MCSWEENEY (Dublin) read a short paper on the treatment of post-diphtheritic respiratory paralysis by the Bragg-Paul pulsator—an apparatus designed by Mr. R. W. Paul at the suggestion of Sir William Bragg. This apparatus was demonstrated by Dr. Kerridge at the Annual Meeting in Oxford last year. Among roughly 2,000 cases of diphtheria treated in the last two years thirty authentic instances of respiratory paralysis had occurred at Cork Street Hospital. Almost without exception the involvement of the respiratory muscles occurred during the sixth or seventh week. These cases had been treated with the pulsator, which consisted of a distensible rubber bag applied around the patient's chest and rhythmically filled with, and emptied of, air from a bellows. Twenty-two of the cases made uneventful recoveries. One of the eight fatalities had been treated in the apparatus for four days, when the machine broke down, and before a new part could be made the patient died. The remaining seven cases died of causes other than respiratory failure—six of them from late cardiovascular failure and one of them from gangrene a fortnight after coming out of the pulsator. There was no interference with the routine management, nursing, and treatment of patients, all of whom were nasally fed—since there was a coexistent pharyngeal paralysis—while being artificially respired. Questions from Dr. ROLLESTON and Dr. WILLOUGHBY were answered by Dr. McSweeney.

Diphtheria Immunization

Dr. G. A. W. NEILL (Huddersfield) read a paper on the variance in type distribution of *C. diphtheriae*. Professor JOHNSTONE JERVIS led the discussion which followed. Dr. E. H. T. NASH reported the end-results of an experiment in controlled diphtheria immunization, and stressed the value of publicity.

Dr. G. CHESNEY (Poole), in a paper on diphtheria immunization, pointed out that there was no such thing as inherited natural immunity to diphtheria. An active resistance of the body to the invasion of the bacillus was not present at birth. It must be acquired and could be acquired only by contact with the bacillus or its toxin. The discovery some fifteen years ago that diphtheria toxoid was as efficient as either the bacillus itself or its toxin in stimulating the production of the protective antitoxin placed artificial active immunization on a safe and secure basis. Dr. Chesney then discussed at length the factors which had to be considered in selecting an immunizing agent. To be regarded as eminently satisfactory a prophylactic should be (1) completely free from toxicity, (2) free from liability to cause sharp reaction, (3) capable of consistently producing a high grade of Schick immunity, (4) capable of rapidly developing this immunity with a minimum of injections, and (5) capable of producing an immunity sufficiently durable to protect from infancy to adolescence. Of the preparations most commonly used in this country toxoid antitoxin floccules, formol toxoid, and alum-precipitated toxoid approached most closely to the fulfilment of these conditions. There was little doubt that alum-precipitated toxoid was superior to both toxoid-antitoxin floccules and formol toxoid in meeting the need for the consistent and rapid production of a high grade and durable immunity, with a minimum of injections, but there was still some debate as to the requisite dosage and number of injections. Alum-precipitated toxoid used in two doses of 0.2 c.cm. and 0.4 c.cm. at an interval of four weeks gave a high level of Schick immunity. The initial small dose, acting as a detector of hypersensitive persons, eliminated reaction difficulties. The high Schick-negative rate obtained obviated the necessity for routine Schick testing after immunization. Of 1,468 children immunized in this way 1,300 were available for retest two months later. In only three children was the Schick test positive. The immunizing efficiency of the prophylactic therefore approached 100 per cent. Reactions immediately after injection caused no material trouble. The grade of immunity reached was high, for over 99 per cent. of the children tested with the "fourfold" Schick dilution were negative to this test. One hundred and twelve children who had been negative two months after immunization were retested eighteen months later; all were negative.

Dr. R. J. MAULE HORNE (Poole) said that he was an enthusiastic believer in diphtheria immunization, but that without great patience, persistent education, and especially great caution its success would be jeopardized.

Dr. J. GRAHAM FORBES described at some length the progress which has been made in the past five years in diphtheria prevention. At the same time he pointed out that diphtheria still exacted a heavy toll from the child population in England and Wales, with a yearly average for the past ten years of over 57,500 cases with 3,100 deaths, London alone having 11,000 cases and 400 deaths each year. He contrasted these statistics with those obtaining in New York and Montreal.

The meeting concluded with a paper from Dr. J. E. H. GATT (Malta) on the control of undulant fever in Malta with reference to the consumption of goats' milk. After discussing briefly the high incidence of undulant fever and the high infant mortality in Malta Dr. Gatt pointed out that since 1898 goats' milk had been banned as an article of food for all troops and marines in the Mediterranean, with the most beneficial results. Notification of the disease had been made compulsory, and the destruction of infected goats was carried out systematically. The civil Government had finally decided to exercise complete control over the milk industry of the island, and it was hoped to secure clean and safe milk for all at a reasonable price by proper pasteurization and distribution, and thus diminish the problems of undulant fever.

SECTION OF OTO-RHINO-LARYNGOLOGY

Friday, July 23

Care of Vocal Cords in Singers and Speakers

With Mr. HENRY HANNA, President, in the chair, the discussion on the care of the vocal cords in singers and speakers was opened by Sir MILSOM REES, whose paper was published in the *Journal* of July 31 (p. 208).

Mr. VICTOR F. LAMBERT (Manchester) said that this subject was the common responsibility of the laryngologist and the teacher of singing, but unfortunately there existed a lack of co-ordination between the two. Both parties were responsible, but a third, the student, was not free from blame. It was very difficult to persuade a school teacher or public speaker that it was not a "bottle of medicine" but rest and a course of voice production which he needed. Such a patient would consider his golf professional futile if he recommended a bottle of embrocation to correct a slice or a pull. At present the advice of the laryngologist was sought only in an acute crisis, whereas the speaker felt that mutual trust should be shown from the beginning of a student's career, when, if the whole of the vocal mechanism were examined, an anatomical record made, and abnormalities corrected before the method of production became fixed, surgery would do most good and least harm.

As the guest of Sir Milsom Rees at Covent Garden he had been able to see and appreciate the results of his treatment of the artistes there. He had been deeply impressed, and proposed in future to copy the technique. He had had personal experience of the tonic effect of the treatment. Of great importance were the earliest signs of failing voice: (1) the inability to start a tone softly without making use of a glottis stroke or jerk in the attack; (2) the inability to pass from a full voice to a half voice without discernible change in quality and adjustment of the organ itself. Constant hoarseness with paraesthesias and even actual pain added to the embarrassment of the singer. There might even be a feeling of tightness such as was experienced in globus hystericus. Bad habits such as hawking and hemming were adopted, and examination showed faulty apposition and bowing of the cords on phonation.

In the speaker's opinion "modulation" preceded "articulation," and he regarded singing not as an offspring of speech but as a descendant of a common physiological ancestor. It was, however, something of a trick, and one not easy to learn. Some were potentially better endowed than others, but none could become finished performers without practice and training. Practice produces habits, and the longer they continued the harder they were to change. Hence the importance of observation by a laryngologist, who would be able to recognize the bad effects of faulty habits while there was still a chance to eradicate them. The basis of treatment was: (1) vocal rest; (2) change in range if wrongly classified; (3) change in method of production (E. J. Moure). To this he would add the local treatment of Sir Milsom Rees. The greatest dangers to a singer's welfare were: (1) failure to recognize the individual requirements of each voice; (2) the tendency to emulate the voice of a distinguished artist although the voice might not be of the same pattern; (3) failure of a teacher to realize that bad methods would give results for a time and that a damaged mechanism would function a long while before failing; (4) the laryngologist who used "laryngitis" to cover the "multitude of his sins of ignorance."

Mr. C. J. BRENNAN could not agree with the apparent pessimism of Sir Milsom Rees with regard to the use of the human voice for singing. He thought that the human voice was admirably adapted to and was intended for musical use with words, called singing. The articulation of the consonants in singing remained the same, while the vowel sounds took on the notes of the melody. The speech must, however, be well placed for the vowel sounds to flow out, tonally expanded, to constitute natural singing. The difficulty with singers was that their "inner hearing" of their own voice gave but little idea of the outward product. He advised those present to listen to a record of their voice. A difficulty with young singers was the urge to do something. Hard work they seemed to feel would shorten the process. In fact, conscious effort interfered with the mechanism. "Let the voice sing, don't make it sing." It was no use looking for too early results. The control of breathing was vital. Add to this the advice to "sing as you speak, provided always that you speak properly." Range must be observed. Accidents were understandable if you realized the immense force passing the cords in a dramatic note. Perfect balance and control was essential, and he could imagine such balance being upset by a drop of moisture. In his opinion many could be good without necessarily being champions, and to be a champion needed some endowment and not brute force alone. One trouble for the student was the appalling division of opinion among teachers as to method.

Mr. DONALD WHEELER, a Vice-President, took the chair for the subsequent discussion.

Mr. T. B. JOBSON pleaded for a central authority from whom reliable voice-training teachers could be recommended. He felt that their appointment to schools should be more general. Mr. J. W. KILLEN (Londonderry) had come more to learn than to contribute. He had learned much. He stressed the importance of careful investigation of the posterior sinuses in cases of pharyngitis and laryngitis. Mr. L. GRAHAM BROWN said he only had occasional cases, but it was none the less important to treat them properly. He would like to know how much Sir Milsom Rees relied on the psychological effect of his treatment. He mentioned the functional aphonia after the first night and the visit with the anxious manager. He had done plenty of tonsil and nasal operations in singers, and felt that where he had not done good he had at least done no harm. Sinus diseases must be cleared up.

Mr. T. O. GRAHAM (Dublin) was interested in Sir Milsom Rees's explanation of the falsetto note. He could not understand how it could be produced by the false cords. He was anxious for advice on nodules; how long should the voice be rested? He saw teachers more than singers, and he removed the nodes when they were fibrosed. In a case of recurring submucous haemorrhage he had used the galvanocautery. He felt that the less medication and the less that was done generally the better the results. Mr. C. DE W. GIBB (Gloucester) found it very difficult to get breath control taught. Mr. E. S. B. HAMILTON (Manchester) asked for information as to diet and exercise, and especially with regard to alcohol. He had once used an injection of strychnine. Mr. R. R. WOODS (Dublin) asked if Sir Milsom Rees had used the stroboscope, and wanted a definition of "catarrh" as used by him. Dr. H. HANNA (Belfast) stressed the importance of co-operation between teacher, student, and laryngologist. It was always difficult to get the subject to rest. Mr. T. A. CLARKE (Canterbury), Mr. F. C. W. CAPPS, and Mr. F. A. MACLAUGHLIN (Belfast) also spoke.

Mr. LAMBERT in reply disclosed that he had started life as a singer. He had been impressed by the real physical effect of Sir Milsom Rees's spray treatment. There was far more than psychological effect in it. In his view the control of breathing must be from below; the larynx had as much to do with muscle tension and balance as it could manage without acting as a sphincter. Captain BRENNAN agreed that breathing was important. He quoted the instance of a Parisian vogue for "abdominal" breathing in singing. He felt that control of the "forward" end of breath flow was as important as the lower end.

Sir MILSOM REES said it had been his "job to crab singers." Managers asked for his advice about contracts. Madame Schumann owed her long career to short, narrow, and elastic vocal cords. One could tell from the examination of a larynx something about the "life" of a voice. Better tuition had given a greater number of good voices, but there were now fewer "excellent" voices. The treatment of nodules depended on "when they came to you." A vesicle required three or four days' rest, with an astringent spray and Moure's exercises, a superficial haemorrhage seven to ten days' rest. Since the war he had not seen one singer's nodules which needed removal. If they recurred it was due to bad production. Occupational nodules (hawkers', etc.) should be removed. Treatment did help other than psychologically in that a free nose and a clear head gave freedom of production. Alcohol was fatal: first, it was not necessary, and, secondly, it might lead to intoxication. Strychnine he had never tried.

Volume XV of the *Guide to Current Official Statistics* has been prepared and issued by the Permanent Consultative Committee on Official Statistics. It is a systematic survey of the statistics appearing in all official publications issued in 1936, and the nature of the information available on any subject and the official publication in which it is contained can be readily ascertained. The *Guide* contains over 400 pages, and is obtainable from the sale offices of H.M. Stationery Office or through any bookseller, price 1s. (by post 1s. 6d.).

Nova et Vetera

A BIBLIOGRAPHICAL BIBLIOPHILE

Of medical men who have sought and found recreation or a career in literature there is no end. Literary men who have interested themselves in the history of medicine, while not so numerous, have often become its greatest ornament. How commendable, therefore, is the policy of the Royal Society of Medicine's History Section to recognize other than medical qualifications for its membership.

Leonard Leopold Mackall, president of the Bibliographical Society of America, who died on May 19 at the age of 58, was fond of describing himself not as a medical historian or librarian, but as a mere bibliophile—bibliographer or bibliographical bibliophile. A familiar figure in Osler's world, a glance through the *Bibliotheca Osleriana* (the completion of which had been entrusted to him among others) shows his name as donor of some of its most precious items, accompanied by meticulous bibliographical notes. He helped to see Osler's *Evolution of Modern Medicine* through the press, and for the *Contributions to Medical and Biological Research* dedicated to Osler he wrote a scholarly paper entitled "Servetus Notes." He was interested in the early history of appendicitis. The New York Academy of Medicine in 1930 had the happy idea to make him its consultant in bibliography, thus publicly recognizing his services to medicine.

As a bibliographer Mackall delighted in accuracy and the over-elaboration of what to some are dry and soulless minutiae, but his literary style was pleasant and his humour refreshing.

Oslerians on both sides of the Atlantic will miss his help, always generously given, with their bibliographic and historical research; will miss, too, his handwriting, so large, so sprawling, and yet so characteristic and so friendly.

W. R. B.

AN AMERICAN FIELD DRESSING STATION SEVENTY-FIVE YEARS AGO

The following account of a Field Dressing Station, Northern, during the American Civil War (1861–2) is a copy of the description by the late Lieut.-General E. O. Hewett, C.M.G., written when he was military observer for the British Government. At that time he was a captain in the Royal Engineers. Lieut.-Colonel E. Hewett, O.B.E., C.M.G., D.S.O., has kindly given me permission to publish this extract.

"I was travelling with a Doctor (British) whose chief interest of course is the hospitals. I always think it as well to see everything, so, having half a day to spare, I agreed to go with him over the main field hospital camp at Smokestown. I am glad now that I did so, but I'd never care to attempt the same a second time. There were some 3,000 wretched creatures (not sick but all brought for operations, lying under the trees within a space of say 300 yards square. Most had straw to lie on, but not all, and there were a few tents. There were about 60 surgeons without coats (chiefly French, German, and Irish) covered with blood and dirt, chatting, arguing, laughing and swearing, and cutting and sawing more like devils and machines than human beings. Large heaps of legs and arms were piled here and there, all sizes and stages of decomposition; the odour was fearful, and the whole air felt thick and putrid, while myriads of flies buzzed and darted rapidly about. I saw about fifty limbs taken off during the two hours I remained there.

"The Yankees have creatures they call Medical Cadets, and these fiends, the moment a limb was off would pounce on it from behind trees and fight for it, and in a few minutes it would be cut into little bits for practice.

"I thought I could stand a good deal, but the stench, heat and flies was so fearful that it made me feel rather queer, and when I saw one of these cadets seize a leg almost before it was off, and holding it by the toe, run away with it, still quivering and bleeding, and ragging and bumping it along the ground, while the other devils chased him, it made me feel for a little time so sick that I felt myself grow pale, and dared not speak for a few minutes. However, I was determined to conquer it and did, though I could hardly help hitting some of the surgeons and cadets. I could talk and help the poor fellows themselves.

"War certainly has two sides to it, though happily it is seldom or never that such repulsive scenes as this take place. It was doubly sad, too, as all the men spoke our language, and looked like Englishmen. The Yankees are a queer people; they have no delicacy in taste or feeling. We always keep the actual operations (when and where practicable, as in this instance) a little apart from the sight of the sufferers or hidden a little, but the Yankees do not attempt his—one thing is that most of their surgeons are Irish and German adventurers who know nothing, and care little, for the Americans themselves—but still to me do not appear to care, whereas it would not do with our men.

"The Yankees are bearing the pain marvellously, and are most patient and cheerful, poor fellows; it was grievous to see such splendid men wrecks for life, and sometimes you would see an old man or a young boy amongst the equally shattered but equally calm."

Bournemouth. JAMES EWING.

ANNALS OF MEDICAL HISTORY

The May number of the *Annals of Medical History*[1] opens with Dr. R. N. de Jong's account of chronic hereditary chorea, usually called Huntington's chorea. Although giving George Huntington, who died in 1916, credit for the best account in 1872, Dr. de Jong points out that the features of this chronic chorea had been described before by C. O. Waters (1841), C. R. Gorman (1848), Germain Sée (1850), and I. W. Lyon (1863). Huntington's description was based on cases he had seen with his father and grandfather on Long Island, and so is a result of inherited observation. In the article entitled "The Strange History of the Vesicle in Scabies" Dr. Montgomery recalls the time, more than a century ago, when scabies was one of the most important diseases in the philosophy of medicine, and was claimed by each of the opposing forces of the humoralists and the contagionists. Dr. Jameson of Saranac Lake pays a tribute in "John Leake and Childbed Fever" to a London obstetrician in the eighteenth century who was overshadowed by the assertive personality of John Denman, "who lost no opportunity, by fair means or foul, to disparage a rival's ability." The plague of 1603 in England is described by Mr. Charles Mullett. Under the title of "Moon Madness" Dr. W. H. Stahl discusses the superstitions about the influence of the moon on menstruation, childbirth, epilepsy, and mental disorder; and in Chapter V of his essay "The Doctor on the Stage," Dr. H. Silvette, writing on the *virtuoso*, has much to say about Samuel Pepys and the Royal Society.

[1] New Series, vol. 9, No. 3, 1937. Edited by Francis R. Packard, M.D. (Pp. 201–292; illustrated. Volume of six numbers, £2 10s.; single numbers, 10s. 6d.) New York: Paul B. Hoeber; London: Baillière, Tindall and Cox.

FAR EASTERN RURAL HYGIENE

CONFERENCE IN JAVA

A Conference on Rural Hygiene for Far-Eastern Health Administrations, summoned by the League of Nations Health Organization, opened at Bandoeng in Java on August 3. It is one of a series that have been, or will be, held in different parts of the world. The proposal to hold this conference was made at the Assembly in 1932 by the representative of India, supported by the representative of China, and was repeated with further support at the Assembly in 1934. The Bureau of the Health Committee was asked as early as 1932 to make a preliminary study of the question and obtain the opinion of the advisory council of the Eastern Bureau of the Health Organization in Singapore, and that council reported in favour of holding the conference. This reflects the growing interest taken in raising the standards of living of the rural population, which comprises the overwhelming majority of the teeming millions of the Far East.

A preparatory committee made a tour around India, Burma, Siam, Malaya, Indo-China, the Philippines, the Netherlands East Indies, and Ceylon, and drew up a report for discussion at the conference. The purpose of this was to state on the basis of a mass of facts, observations, and experiences the fundamental terms to which the problem of rural medicine and health can be reduced in the conditions prevailing in the Far East. The chapters of the report give a general indication of the matters discussed under each item of the agenda of the conference. The agenda comprised: (1) health and medical services; (2) rural reconstruction and collaboration of the population; (3) sanitation and sanitary engineering; (4) nutrition; (5) measures for combating certain diseases in rural districts.

Health and Medical Services

The first chapter surveys the different forms of health and medical services that exist in the Far Eastern territories represented at the conference. It draws attention to "the burning question whether, having regard to the desires of Asiatic society, one or more than one type of doctor should be trained. In other words, should there be only one body of fully trained medical men, or should there also be schools for the rapid and hence incomplete training of students?" The pros and cons of the practice of training so-called "semi-qualified" or assistant doctors are discussed, and the possible alternative of auxiliary medical staff under efficient supervision by doctors trained on European lines is indicated.

"European medical science is everywhere invading Asia, where it encounters what has remained of the old medical lore of Hindu medicine, the Arabian school, and the old Chinese institutions, all of them based upon traditional empiricism. The importance of all this should not be underestimated, and official medical science, over-confident of its own infallibility and of the inferiority of this ancient popular medicine, has made the mistake of scorning it. Yet many an old precept can be found which accords with our own views, even though put in a somewhat different form. Thus, frequently we strongly oppose the use of the medicinal herbs and other substances of popular Eastern medicines, forgetting that our own pharmaceutical industry has produced, in addition to sound and valuable medicines, much that it would have been better never to administer to any sufferer. The study of these ancient medical cultures and of their remaining vestiges would be of value. They should have a place in the training, so that the young doctor may have at least an elementary knowledge of these questions when he begins practising. Such knowledge is essential if he is to adapt himself to his social environment. Lastly, it would be desirable honestly to consider how far these old medical traditions can be reconciled with our own principles, instead of rejecting them in a body as useless and obsolete."

Rural Reconstruction and Sanitation

The second chapter begins by pointing out that there is no more familiar cry in the newspapers of every Far Eastern country than rural reconstruction. It is also a cardinal point in the policy of Governments and in the activities of voluntary bodies and charitable associations of all kinds. This is particularly the case in India.

"It is perhaps somewhat strange that this concentration of interest in the rural problem should occur simultaneously in all these countries, and that it should be so recent and so comparatively sudden. But it is indisputable that a reorientation of governmental policies is taking place, and that the needs of the distant and inarticulate peasant are being weighed in the council chambers where hitherto his voice has been little heard. . . . With the perception of the possibility of improved conditions of life is growing the desire to attain them. The progress of education is having its effect. Interest is being shown in the improvement of health, in economic problems, and in all matters which affect the maintenance of a reasonable standard of living. The dullness of village life is being dissipated by the dawn of rural reconstruction."

In this connexion the importance of education and of the spread of the co-operative movement is stressed, and methods by which health authorities enlist the interest and support of the peasants are described.

Chapter 3 of the report covers the subject of sanitation and sanitary engineering in the agenda. Housing, drinking-water supply, latrines, manure and household refuse, and fly control are all discussed.

Food Problems

The fourth item on the agenda is covered by the chapter on nutrition in the preparatory report. Investigations into the state of health of the peoples of the East, no matter what their starting-point, lead back invariably to the question of nutrition. Dietetics is a branch of science which has a variety of aspects in Asia; there, even more than elsewhere, dietetic research requires the close co-operation of chemists, physicists, agronomists, physicians, veterinary surgeons, and economists.

The prevailing opinion is that the state of nutrition of the populations of rural districts is not wholly satisfactory in any of the Asiatic countries. It is thought that of the 1,150,000,000 inhabitants of that continent not less than 75 per cent. have a diet below the standards fixed by European science. From various publications, and from the information that the committee collected during its tour, it appears that a large part of the population is living on the border-line of the minimum requirements, while millions are even below that level.

"These statements should, however, be accepted with some caution, because an examination of the studies so far made in Asia shows that few accurate statistics are available. Whereas in other continents there has been on occasion overproduction of food at different times and places, so that production has been restricted and food even destroyed, this has never occurred in Asia. Everything produced is always quickly consumed, and, so far from there being a limitation of crops, the dominant question everywhere is how to increase them. An exception may be made as regards a few articles intended for the world market, such as sugar and copra. The food problem in the East is almost exclusively a rural problem, since more than 90 per cent. of the population live outside the towns."

This chapter reviews such subjects as the composition of the diet of the rural populations, the chemical composition and biological value of the different foodstuffs, different diseases of alimentary origin, and the proportion of the family budget spent on food. The final remarks are to the effect that a well-fed and healthy population is vital to every country for its development and future. But in all Asiatic countries only relatively trifling sums are allocated to the detailed study of national nutrition or to attempts to improve it. Some authorities think this is a field that should rather be left to private initiative. The public authorities still fail to appreciate the great importance of food problems. Only in the event of war or economic depression do they decide to act. The growth of the population and the ensuing increased importance of ade-

quate nutrition will help to wean most Governments from this short-sighted policy. The assertion often made that very primitive peoples show an unfailing intuition in regard to their food supply in time of need is obviously exaggerated, and, indeed, is contradicted by practical experience. A small measure of intuition there certainly is, but it can easily be overrated. If the conference helps to bring about a change in the views of some of the Governments that will in itself be an appreciable advance.

Need for Administrative Contacts

The final chapter reviews the chief diseases affecting the rural population of Far Eastern countries and the measures for combating them. These diseases are: malaria, plague, ankylostomiasis, tuberculosis, pneumonia, yaws—described as "the rural disease *par excellence*"—and leprosy. One of the chief results expected from the conference is improved contacts between the health administrations of different countries and colonies, and even of different provinces in, for instance, India. At present health administrations often work at similar or identical problems without knowledge of each other's activities and their results.

THE NATION'S HEALTH SERVICES

ANNUAL REPORT OF THE MINISTRY

The eighteenth annual report of the Ministry of Health,[1] for 1936–7, was published last week. The seven parts into which it is divided deal successively with the Ministry and the public, finance, public health and assistance, housing and town planning, local government organization and finance, national health insurance and pensions, and the work of the Welsh Board of Health. In presenting the report Sir Kingsley Wood refers to the striking progress in national health since the Ministry of Health was first established in 1919, the post-war housing achievement and accompanying changes for the better in living conditions and social habits, the various local health services, and the health insurance and contributory pensions schemes. Turning to the period covered by the present report, he suggests that this and the current year may appear to the future historian as noteworthy for the steps taken to strengthen what seemed to be the weakest links in the existing chain of public provision for health and welfare.

"Thus the setting up on a national scale of a public service of skilled midwives, with the detailed improvement of their existing maternity services by a large number of local authorities, was designed to strengthen these services at their most vulnerable point—the mother's own life and health. Again, the measures in hand to extend the child welfare and school medical services upwards and downwards respectively, by providing better attention for children too young to attend school and so improve their health still further, are intended to close this gap in the existing facilities. At the time of writing proposals are before Parliament for closing another gap—that between the school medical service and entry into the health insurance scheme at the age of 16. Finally, mention should be made of the Act of Parliament, passed while this report was in the press, extending the existing contributory pensions scheme so as to allow independent workers and professional and other persons of small means to insure for pensions if they wish to do so."

£65,000,000 of Exchequer money was spent in 1936 on services administered by the Ministry, £2,200,000 of which went on central administration. The remainder consisted of grants to local authorities (including "block grants" of £40,000,000 and housing grants of £14,000,000) and to national health insurance funds. The Ministry also accounts for the national health insurance funds and administers the Contributory Pensions Scheme, involving the expenditure of £75,000,000.

[1] H.M. Stationery Office. Cmd. 5516. (5s. net.)

Maternity and Child Welfare

There are now over 3,000 infant welfare centres (fifty-eight more than in 1935) and 1,568 ante-natal clinics (seventy-seven more than in 1935). The maternal mortality rate was 3.81 per 1,000 live births—the lowest rate since 1922. The new Midwives Act will ensure a qualified midwife for every confinement, whatever the patient's means. The infantile mortality rate was 59 per 1,000 births—the third successive year in which it has been below 60—and would have touched a low record but for bad weather, which increased the deaths in the first quarter of the year. Forty-six authorities have established separate "toddlers clinics" at their centres, and fifty-six have made the school medical service available for the younger children. Out of 374 maternity and child welfare authorities 364 supply free or cheap milk to expectant mothers, 363 to nursing mothers, and 362 to young children.

Infectious Diseases

Tuberculosis mortality was the lowest on record. For example, in 1931 there were 29,658 deaths from pulmonary tuberculosis and 6,160 from non-pulmonary tuberculosis; the figures for 1936 are 23,801 and 4,467 respectively. There were 121,951 *x*-ray examinations in connexion with the tuberculosis dispensary service in 1936, compared with 63,823 five years previously.

There were 3,232,986 attendances at venereal disease centres during 1936, compared with 1,534,000 in 1921; but over two-fifths of the new cases dealt with in 1936 proved not to have venereal diseases. The total number of cases of syphilis dealt with at English treatment centres has been reduced by 56 per cent. since 1920.

Notifications of diphtheria were 7,290 less than for 1935, but still considerably in excess of those for 1933. Encephalitis lethargica continues to decline, notifications being less by 38 per cent. than in 1933. There were 2,493 notifications of enteric fever (including paratyphoid), compared with 1,750 in 1935. The increase was mainly the result of an outbreak of 718 cases at Bournemouth, Poole, and Christchurch last summer, with fifty-one deaths, and was due to the drinking of infected raw (that is, unpasteurized) milk. An outbreak of over 160 cases of scarlet fever at Doncaster and one of gastro-enteritis at Wilton were also traced to the drinking of infected raw milk. As is stated in the introduction to the section on public health, these "distressing outbreaks of milk-borne disease . . . have emphasized the importance of public safeguards for the milk supply and the protection afforded by proper pasteurization."

Milk and Nutrition

The report stresses that national health cannot be reached or maintained without food adequate both in quantity and in quality. Special interest therefore attaches to the first report of the Advisory Committee on Nutrition, which drew attention to the great improvement in the health of the people as a result of the practical application of the discoveries in the science of nutrition. There is, nevertheless, "a large number of disturbances of nutrition, amounting in some cases to actual disease, which are due to improper or defective diet." The Advisory Committee has pointed out that there is, accordingly, much room for further improvement in the health and physique of the nation, which can be promoted by the consumption of adequate amounts of the "protective foods," the most important being milk and its products, green vegetables, fruit, and eggs. The consumption of a sufficient quantity of milk is regarded as the "key to proper nutrition." But the consumption of liquid milk per head has slightly declined since before the war. The

Advisory Committee recommended that the daily consumption of milk should be about two pints for expectant and nursing mothers, from one to two pints for children, and not less than half a pint for the rest of the population—equivalent to about seven-eighths of a pint a day per head of the whole population. At present the consumption of milk in all forms is about half a pint a day per head, or only 60 per cent. of the recommended amount.

Since the coming into operation of the Milk (Special Designations) Order, 1936, the only grades of special milk now officially recognized are "tuberculin tested" and "accredited." Both these, like ungraded milk, may be sold as "pasteurized," but if so the pasteurization must be effected in a specified manner—that is, the milk must be retained at a temperature of 145° to 150° F. for at least thirty minutes, and a sample taken at any time after pasteurization and before delivery to the consumer must not contain more than 100,000 bacteria per millilitre.

Public analysts analysed 146,438 samples of food and drugs, of which 7,802 (5.3 per cent.) were reported against: 80,082 of the total were samples of milk and 7,588 were samples of butter.

Sanitary and Other Services

The three services of water supply, sewerage and sewage disposal, and public cleansing (excluding street cleansing) now cost local authorities £22,400,000 a year in maintenance costs alone; in 1900 the corresponding figure was only £5,000,000. Public cleansing, the oldest sanitary service of all costs the rates about £11,000,000 a year. House refuse alone amounts to about one ton per year (or 6 lb. a day) per house. During the past five years the average weight of refuse has come down by 15 to 20 per cent., the result, it is thought, of less cinder and fine mineral dust, due to the greater use of improved fireplaces and of gas and electricity.

The Ministry sanctioned loans totalling £3,196,002, compared with £2,467,245 in 1935, for parks, recreation grounds, and playing fields. This includes the purchase of 9,059 acres (including 1,030 acres specifically for games), compared with 4,732 acres in 1935. Large schemes were approved for covered baths at Coventry, Crewe, Kingston, Lancaster, Northampton, and Sutton and Cheam, and for open-air baths at Brighton, Nottingham, Stroud, and West Ham. The cost of a number of open-air pools in the special areas will be assisted by special Government grants: these include schemes at Abercarn, Bridgend, Caerphilly, Merthyr Tydfil, and Mountain Ash.

Hospitals

Local authorities are steadily building up a service of general hospitals as an integral part of municipal health services, and in association with the voluntary hospital system ninety-two Poor Law institutions, containing 50,073 beds, have now been appropriated in whole or in part as public health general hospitals: "The test for admission is no longer destitution, but the need for the kind of treatment which the hospital is able to give." The report points out that an important result of appropriation is to facilitate co-operation between the county or county borough council and the voluntary hospitals in the area, by way of engaging members of the staffs of voluntary hospitals, and by arranging what kinds of illness should be treated in the two classes of hospitals and for transfer of patients from one to the other. It has been estimated that local authorities provide about seven-tenths of the total number of hospital beds in England and Wales, or, if accommodation for infectious diseases is excluded, about two-thirds.

"The power conferred on county councils to provide general hospital accommodation, the concentration of the responsibility for public provision of the various forms of accommodation for the sick in the hands of a single authority in each area, and the subsequent activity in hospital provision, have thrown into relief the urgent necessity of securing in every area that the relation between the public and the voluntary systems should be co-operative and complementary and not overlapping and competitive. This task is at once most pressing, and presents most complications, in the field served by the general hospital for the acute sick.

"Section 13 of the Local Government Act of 1929 laid down a minimum requirement—that is, that a local authority when making provision for hospital accommodation in discharge of the functions transferred to them by the Act should consult such committee or other body as they considered represented the voluntary hospitals serving the area. In the early surveys, while it was clear that some local authorities realized the importance of co-operation with the voluntary hospitals, indications were met with that consultations were being regarded in a few areas as being merely a matter of form, while other authorities were satisfied with the minimum required by the Act. The Minister has taken every opportunity of urging the necessity of close and continuous co-operation, and he is glad to know that during recent years much has been done to secure this."

Housing

The year under review was the fourth of the "five-year plan." Up to the end of 1936 100,355 houses had been demolished and 127,553 houses built to replace them. The end of the five years is expected to see the completion of the programmes, except in London, Birmingham, Liverpool, Manchester, and Leeds, which have special problems necessitating a further period of time. The nation-wide survey of overcrowding revealed 341,554 of the 8,924,523 dwellings inspected to be overcrowded according to the standard of the Housing Acts. Fresh overcrowding ceased to be permitted for the areas of 96.6 per cent. of the local authorities during the year.

Local Government Finance

The three main sources of local government revenues are rates, Government grants, and receipts from trading services, house rents, and miscellaneous income. In 1934–5 £154,782,080 was collected in rates; £124,353,931 was received in Government grants (of which £45,409,836 was block grant and £40,407,467 for education); and £181,568,094 was derived from other sources of income, including £116,000,000 from trading services (chiefly water, gas, electricity, and transport). The total expenditure of local authorities for the same year was £80,657,889 on capital account, £100,984,164 on loan charges, and £353,775,105 on revenue account other than loan charges. The heaviest single item of expenditure was education. The gross outstanding loan debt of all local authorities at March 31, 1935, was approximately £1,421,500,000, a third of which was for housing.

National Health Insurance

In England and Wales 16,500,000 men and women are covered by the statutory benefits (cash and medical attendance) of national health insurance, and over two-thirds of them are also entitled to additional benefits, such as dental and ophthalmic treatment. As a result of better trade conditions the number of persons insured for national health insurance increased by 2,8 per cent. during the year, and the amount of contributions by 4.8 per cent. The revenue of 1936 exceeded that of 1932 by £3,000,000—representing 80,000,000 working weeks. Medical benefit cost £9,430,000, of which £6,868,900 went to doctors for attendance and treatment and £2,084,600 to chemists for drugs and appliances. As regards additional benefits, £2,174,000 was allocated to dental and £542,663 to ophthalmic benefit.

The report contains, as is customary, a separate section on the work of the Welsh Board of Health, and concludes with fifty-six appendices and a full subject index.

Local News

SCOTLAND

Research in Animal Diseases

At the annual meeting of the Animal Diseases Research Association at the Moredun Institute, Edinburgh, on July 28, the disease of horses known as grass sickness was discussed. An extensive field experiment financed by the Government had been conducted to determine whether a toxin found in cases of the disease was a causal factor, and it was reported that this toxin did not appear to be of primary significance. This negative result at all events cleared the way for future work. Dr. Russell Greig said that this field experiment had been the most extensive and most closely supervised of its kind which had ever been attempted in this country. The toxin had been administered to about forty horses and did not produce grass sickness. About 1,000 horses had been treated by a vaccine prepared from the toxin, with 2,000 unvaccinated horses as controls, and the evidence obtained from this was also of a negative character. With regard to bovine abortion, Dr. Greig said that systematic research had shown that a vaccine was capable of affording a certain amount of protection to small animals, and this work was now being applied to bovine animals. The disease of louping-ill in sheep had been treated with good results by a vaccine, of which 107,000 doses had been issued by the institute last year, and lamb dysentery serum, of which 71,300 doses had been issued, had also proved satisfactory.

Incapacitating Sickness in Scotland

The sixth report upon incapacitating sickness in the insured population of Scotland, dealing with the period from July 1, 1935, to June 30, 1936, shows that chronic incapacity is on the increase. The most variable cause of incapacity from year to year had been influenza, but during 1935–6 the lowest number of cases since recording began had been attributable to this cause, and a fall of 5 per cent. in the incidence of incapacity compared with that of the previous year was more than accounted for by the low influenza prevalence. Notwithstanding this drop, the number of days of incapacity per insured person had risen by 5 per cent., or fully half a day per person per annum over those of the previous year. The volume of incapacity per person per annum amounted to eleven and a half days, which formed a new high record. The duration of incapacity had also increased in all conditions except those of the respiratory diseases, general diseases, diseases of the circulatory system, and pregnancy. The increase in chronic incapacity affected particularly the average duration of illness—fifty-two days—which exceeded anything previously recorded. The insured population for the year had been 1,725,198, composed of 1,134,681 males and 590,517 females. This was an increase on the number of 1,708,494 for 1934–5. The days of incapacity for the year amounted to 12,394,412 for males, and 7,350,572 for females. The total days lost were therefore approximately 20,000,000—the equivalent of 54,000 persons constantly sick throughout the entire year. There was a loss of 1,166,406 more days than in 1934–5, or as compared with the average of the previous five years an increase of 2¼ million days.

A percentage analysis of the causes of incapacitating sickness showed diseases of the respiratory system to be responsible for 33 per cent. of the cases, rheumatic diseases coming next with 12 per cent., diseases of the digestive system 11 per cent., skin and septic conditions 10 per cent., and various forms of violence 10 per cent. The days of incapacity per person showed considerable geographical variation, being, for example, between eight and nine days in Edinburgh, ten to eleven days in Glasgow, eleven to twelve days in Dundee, and twelve to thirteen days in Aberdeen. The occupational incidence of sickness also showed great variation; those males engaged in mining and quarrying showed an outstandingly high rate, 70 per cent. in excess of that for all males. Textile and paper workers also had a rate of incapacity 7 per cent. above the average. On the other hand, persons engaged in personal service—for example, domestic servants and chauffeurs—showed a rate 30 per cent. below the average, and clerks, shop assistants, etc., had an incidence of incapacity 20 per cent. below the average. Among females women engaged in transport work showed 30 per cent. above the average, while among those engaged in metal trades and in making foods and drinks the rate was 30 per cent. below the rate for all women. The report directs special attention to the subject of chronic incapacity, and states that chronic illness accounted during the year for more than half of the total volume of incapacity in the insured population of Scotland, or 11 million out of 19¾ million days. It has been argued that there might be a progressive building up of excess of permanent invalidity, and that only in 1961, when the Insurance Act will have lasted for a period equivalent to the span of insurance life—that is, sixteen to sixty-five years—will stability be reached. It is pointed out, however, that the proportion of chronic cases surviving to-day whose incapacity began in the early years of the Act is inconsiderable. The report may be obtained from H.M. Stationery Office, 120, George Street, Edinburgh, price 9d. net.

ENGLAND AND WALES

Welsh Board of Health Report

The report of the Welsh Board of Health for 1936–7, which has now been published as part of the Annual Report of the Ministry of Health (H.M. Stationery Office, Cardiff, price 5s. net) reveals steady progress in the public health services of the country. The infant mortality rate of 62 per 1,000 births and the tuberculosis death rate of 861 per million of the population are in each case the lowest yet recorded for the principality. The maternal death rate has also declined, and the rate of 5.17 per 1,000 births for 1936 is, except for 1931, the lowest recorded since 1926. It compares with 6.08 for the period 1933–5. On the health insurance side sickness experience appeared to be on the down grade generally, but an epidemic of influenza in December and January caused increased expenditure, which resulted in the total sickness expenditure being heavier than in 1935. Owing to improving industrial conditions many persons previously unemployed are qualifying afresh for sickness and disablement benefits, and thus become entitled to all the benefits provided under the National Health Insurance Act. During the year the Midwives Act, 1936, came into operation, and proposals under the Act for the provision of a domiciliary service of salaried midwives have been submitted by all the local supervising authorities. The treatment of tuberculosis is carried out in Wales by the Welsh National Memorial Association on behalf of the county and county borough councils, and a new scheme has been made by the Minister of Health providing for the payments by the councils for the third fixed grant period (1937–42). According to the report facilities for the treatment of the sick are provided by local authorities at forty-three institutions (5,168 beds) maintained under the Poor Law Act, 1930, and at five institutions (438 beds) maintained under the Public Health Acts. As regards Poor Law domiciliary medical relief, it is mentioned that the "panel" system is no win operation in the greater part of Glamorgan and that one other county council has made similar arrangements in three of its medical relief districts. Approximately 979,000 persons (763,000 men and 216,000 women) in Wales are insured for national health insurance purposes out of a

total population of 2½ millions. The total receipts (inclusive of Exchequer grants) during 1936 were £1,983,000, and £1,662,000 was spent on benefits and £324,000 on administration. Sickness benefit accounted for £575,000, disablement benefit £363,000, and medical benefit £545,000. The number of doctors participating in insurance practice was 969.

The Red Cross Rheumatism Clinic

The annual report of the British Red Cross Society's clinic for rheumatism records continued progress, the attendances in the general department during 1936 numbering 95,622, an increase of nearly 6,000 on the previous year. Although the number of advanced cases of rheumatism is still comparatively large, it is stated that a greater proportion of patients in the early stages of the disease are now seeking treatment. With regard to the results of treatment 60.3 per cent. of cases are classified as free from subjective symptoms and 29 per cent. as definitely improved; the first category shows a slight preponderance of men, the second of women. The report stresses the importance of protracted convalescence in healthy surroundings for early cases of rheumatoid arthritis, and suggests the desirability of a building for this purpose being made available within a reasonable distance of London. Facilities for research on a large scale are also urgently required, whereby the valuable clinical material passing through the clinic may be utilized for the furtherance of knowledge of rheumatic diseases. Under present conditions the ever-increasing number of routine examinations and treatments demand not only the whole time of the staff but also all available accommodation at the clinic. The question of in-patient treatment is also a pressing one. A number of beds are reserved for rheumatic patients by the London County Council at St. Stephen's Hospital, but the report emphasizes the importance of the provision of in-patient accommodation under the direct supervision of the staff of the clinic. It is obvious that the time is now ripe for expansion, and that the work of this institution will be seriously handicapped until these deficiencies can be made good. The financial report shows an increasing deficit, the adverse balance standing at more than £4,200 at the end of the year. It is to be hoped that means may be found to enable the clinic, which in a few years has made for itself a great and deserved reputation, to be placed on a more satisfactory financial footing, and to secure the provision of the three things so essential for its future progress—namely, research facilities, in-patient accommodation, and a convalescent hospital.

Heatherwood Hospital, Ascot

The extension of this hospital, which the London County Council in 1935 decided to provide at an estimated cost of about £72,000, has been completed and is now in occupation. Heatherwood Hospital was originally established in 1920 by the council of management of the United Services Fund for children of ex-service men suffering from surgical tuberculosis and other orthopaedic diseases. In December, 1929, the Fund offered to transfer the hospital to the L.C.C. as a free gift after the cessation of the Fund in about eight years from then, and this generous offer was accepted. Subsequently the Council agreed to take over the hospital on October 1, 1934. The decision to enlarge Heatherwood Hospital was taken in connexion with a proposal to change the user of Princess Mary's Hospital for Children, Margate. The 271 beds at the latter hospital had been used for surgical tuberculosis, but there had been a progressive diminution in the number of such cases and parents were often unwilling to send children who were seriously ill, and likely to be away from home for prolonged periods, to a hospital so far from London. From many points of view it is desirable that children with surgical tuberculosis should be nearer to London, an important consideration being the readier availability of the Council's consultant and specialist organization. It was decided, therefore, to convert Princess Mary's Hospital into a much-needed seaside convalescent hospital for London women and to extend Heatherwood Hospital by providing an additional 100 beds. This hospital is fully equipped for the types of case sent there, and being situated, within reasonable distance from London, in 55 acres of grounds partly wooded and partly laid out as gardens, is very suitable for the purpose. The hospital, as the L.C.C. took it over, consisted of three single-story ward blocks, one for children up to the age of 7 and one each for girls and boys over that age, with an up-to-date light treatment block, workshops for the making of splints and surgical appliances, a hospital school, administrative buildings, and staff quarters. The design of the new block was decided on after careful consideration of other modern hospital accommodation in this country for the type of case sent to Heatherwood. It is a one-story double ward block for 100 patients planned for effective open-air treatment.

Correspondence

Treatment of Giant-cell Tumours of Bone

SIR,—It was with surprise that I read the dogmatic statements of some surgeons at the recent Belfast meeting that the treatment of giant-cell tumours of bone should almost always be operative (*Journal*, August 7, p. 285). I had the good fortune to attend an animated discussion on this subject at the Presbyterian Hospital, New York, just over a year ago. Since American figures were quoted freely at Belfast it may be of interest to record the views of some leading New York surgeons.

Excitement over the subject was aroused by a medico-legal case. A man had been knocked down, and a radiograph taken soon afterwards showed a giant-cell tumour in the femur above the knee-joint. This was treated with *x* rays, which was then, as now, considered the treatment of choice. No biopsy was made at first. About two months later another radiograph was taken in order to note the progress, and the lesion appeared larger. Some said this meant it was malignant, but others, notably Dr. Haagensen, said that this was the normal appearance of a giant-cell tumour at this stage of treatment, which should continue. It was decided to operate, however, and a frozen section was made; this was not conclusive, and the limb was amputated. Later sections showed that the tumour was benign. The man claimed damages from the person who knocked him down on the grounds that the tumour did not respond to *x*-ray therapy because of the accident. The jury failed to agree on four occasions, and I do not know the outcome of the case. Professors Ewing and Wood were called in on this case, and said that they were sure the case would have progressed well had *x*-ray therapy only been used.

At the discussion it was said that the radiological diagnosis of giant-cell tumour in bone was correct in about 95 per cent. of cases, and for these there seemed no doubt that *x*-ray therapy was the treatment of choice. There can be no question that it does give a complete cure, and the difference in the patient's comfort with this treatment as compared with that of surgery is so obvious that it needs no comment. The first point on which they were unanimous was, therefore, that given a correct *x*-ray diagnosis of giant-cell tumour the treatment should be by *x* rays. The second point was that *x*-ray therapy and local surgery, including the taking of a biopsy, should never under any circumstances be combined, since the two together were liable to make the tumour malignant. I saw such a case in Northampton a year ago. Dr. Haagensen thinks the extreme vascularity of these tumours

is the reason for this danger. If a biopsy is indicated then surgery is the only treatment to be considered, whatever the result of the biopsy. In such cases a quick frozen section at the time of operation is of the utmost value in many cases; the nature of the lesion may be obvious from it and the appropriate treatment can be given with the patient still under the anaesthetic. At the Presbyterian Hospital avertin and gas and oxygen is the routine anaesthetic for these cases; its value while the diagnosis is being discussed is obvious.

If the frozen section leaves doubt as to the nature of the tumour, what is the correct procedure? Some are emphatic that the case should be immediately treated as if it was malignant, because there is danger of metastases while routine sections are prepared. Dr. Haagensen and many others, in quoting the results of observations on something like 30,000 cases, are more emphatic that no deliberate treatment should be undertaken while the diagnosis is uncertain, and that there is no danger whatsoever in waiting a week for perfect sections. Such a statement is contrary to the surgical principles on which we were reared, but it does seem that the evidence in support of it now forthcoming from the United States is so overwhelming that we are arriving at a point at which it is useless to deny its truth any longer.

The second point on which there is a difference of opinion is in the 5 per cent. of cases in which the tumour was malignant from the start. In these cases amputation is the operation of choice. Most of the patients who have recovered have been so treated. It is admitted to be better than *x*-ray therapy, but how much better? The American Registry certainly has records of a few five-year cures, but the chances of success are so remote as to be almost negligible. The Presbyterian Hospital so far has had no cures in these cases. The practical point then is this: if a patient has a femoral tumour which an experienced radiologist thinks is a giant-cell tumour, should he take the 95 per cent. chance of an ideal result with practically no loss of work which modern *x*-ray therapy offers? Or should he suffer at the hands of the surgeon for fear that he is one of the 5 per cent. of cases in which the radiologist is wrong. Then, if he is in that 5 per cent., what prospects does amputation hold for him? Let us not deceive ourselves: it is death almost as surely as if he had tuberculous meningitis.

If I am ever in such a position I can assure Mr. Harry Platt that I will not even think of the treatment he advises, and if I prove to be in the unfortunate 5 per cent. I will not take an action against the radiologist, but die in the belief that death was inevitable. The view that these cases should be all treated surgically is opposed by that of such surgeons as Drs. Allen Whipple, Hugh Auchincloss, Cushmann Haagensen, and many others with an enormous experience. Most of the confused ideas have resulted from ignorance of the *x*-ray appearance of giant-cell tumours undergoing treatment by radiation, thus leading to the dangerous mixture of the two forms of treatment. (The senior radiologist at the Presbyterian Hospital was on holiday when the *x*-ray was taken which led to the amputation of the limb mentioned previously.)

My own experience of these cases is naturally very limited, but such as it is it is entirely in accord with Dr. Haagensen's teaching. Because correct treatment can cure these tumours the subject is one of enormous importance and a definite procedure should be established.—I am, etc.,

Aug. 7.

G. R. OSBORN,
Pathologist, Derbyshire Royal Infirmary.

Elongation and Dilatation of the Colon

SIR,—I should like to corroborate some of the remarks made by Professor Learmonth in his address on elongation and dilatation of the colon (*Journal*, July 24, p. 154). In my experience lumbar sympathectomy can be relied on to produce dramatic improvement in all cases of true Hirschsprung's disease. Moreover, the improvement appears to be permanent. I have two patients who were operated on ten years ago, and their bowel function remains perfect. In both these cases a barium enema still shows a grossly dilated colon as large, or almost as large, as before the operation. On the other hand the *x*-ray appearances of the colon after a barium meal are normal.

Like Professor Learmonth, I have no faith in sympathectomy as a cure for intractable constipation. I have tried the effect of this operation in ten cases. Seven showed no improvement, three cases showed temporary improvement, but as time went on all of them relapsed into as bad a state as before operation. I am aware that from time to time successful results have been published—I have myself reported such a case—but I am more and more convinced that these results are due to improved dieting and not to the operation.

I have tried at one time or another many methods of depriving the distal colon of its inhibitory nerves, and agree that Telford and Stopford's operation is the most eclectic and therefore the most desirable. I prefer, however, an extraperitoneal approach to the sympathetic cords, and use an oblique incision in the position and direction of McBurney's incision for appendicectomy. The muscles of the abdominal wall are split in the direction of their fibres and the peritoneum is retracted inwards, exposing the sympathetic cord. Spinal anaesthesia greatly facilitates the operation, which is a minor procedure taking no more than fifteen minutes. The convalescence is quite uneventful; the patient can be up in five to seven days and go home a few days later.—I am, etc.,

Liverpool, Aug. 6.

J. B. OLDHAM.

SIR,—While in agreement with the substance of the letter by Mr. D. Ligat and Dr. T. D. Overend in the *Journal* of August 7 (p. 293), I wish to correct its reference to myself. The writers say, "without agreeing with Mr. Slesinger (*Lancet*, 1926, **2**, 274) that dolichosigmoid forms in itself a sufficient indication for colectomy, we must maintain . . ." and so impute to me the unholy desire of removing every pelvic colon which exceeds its normal length! I need hardly say that such misguided surgical enthusiasm was never mine, and if I may quote from my original paper on the matter my views will, I think, become clear. I wrote: "The pelvic colon varies in length between considerable limits in perfectly healthy individuals, and is relatively much longer in the infant than in the adult. The following remarks are therefore not intended to suggest that elongation of the pelvic colon necessarily results in the production of symptoms, but rather to point out that in certain cases such elongation produces results sufficiently severe to call for relief. . . ."

In the eleven years since that paper was written I have performed the operation of excision of the pelvic colon for dolichosigmoid twenty times, a record hardly suggesting that I think that "dolichosigmoid forms in itself an indication for colectomy."—I am, etc.,

London, Aug. 9.

E. G. SLESINGER.

Treatment of Enuresis

SIR,—I read with interest the article by Dr. Robert Hutchison in your issue of July 31 (p. 206). The fact that enuresis is mostly nocturnal and the result of vagotonia suggests some allergic significance. In the young vagotonic tolerance is low. In many cases fear will induce decontrol of the sphincters of both bladder and rectum; it can thus readily be inferred that allergic children will show a greater tendency to enuresis. Bray (1934) points out that he has successfully treated cases on this assumption. The value of treatment by belladonna and ephedrine also suggests a close alliance with allergic diseases such as asthma, in which vagotonic inhibition is low.

As organic stimuli in the majority of cases can be excluded (Hutchison, 1937), psychological effects must be considered. Dr. R. G. Gordon (1937) maintains that organic factors, if present, simply loosen the higher centre controls. In sleep the conscious mind is out of action, but the unconscious continues to operate in the form of dreams. Dreams are a medley of repressed memories (Hart, 1930). Dreams of grief are likely to break through any weakness in the inhibitory barrier, and stimulate the corresponding vagotonic centre. Psychological factors in vague rheumatism also show a striking analogy (Halliday, 1937). If this process be mitigated, then it is possible that inhibition will be strengthened. Belladonna depresses vagotonia; ephedrine modifies vagus activity by stimulating the antagonistic properties of the sympathetic. Therefore, cessation of enuresis, however produced, will tend to eliminate egocentricity and at the same time repress the potency of the grief. Witness the happy expression of the child that has just passed an uneventful night. In order to produce inhibition drugs are first tried; psychotherapy may be helpful in older children and in adults, but a suitable psychological atmosphere must be created. Parents should evince no distress nor adopt any unfavourable attitude, and allergic tendencies should be investigated. Climatological factors should be dealt with by consideration of general health improvement in the light of Kestner's (1937) researches. He gives an admirable scientific discussion of the mental and physical benefits of fresh air. The following case may be of interest.

A young man, aged 25, had suffered from enuresis and faecal incontinence (both nocturnal) since childhood. Bromides and belladonna plus the treatment of haemorrhoids cured his faecal incontinence, but enuresis persisted. Unfortunately—or fortunately—he discontinued medical treatment. Some months later I met him and inquired about his condition. With a cynical grin he told me that a glass or more of beer at night had "completely chased his bed-wetting." In other words, he had succeeded in "drowning his sorrows."

Although I was impressed, I have not yet felt sufficiently heroic to prescribe this treatment.—I am, etc.,

Birmingham, Aug. 7. A. W. DOCKAR.

REFERENCES

Bray, G. W. (1937). *Recent Advances in Allergy*, p. 459.
Hutchison, R. (1937). *British Medical Journal*, **2**, 199.
Gordon, R. G. (1937). Ibid., **1**, 1297.
Hart, B. (1930). *The Psychology of Insanity*, p. 22.
Halliday, J. L. (1937). *British Medical Journal*, **1**, 203.
Kestner, O. (1937). Ibid., **1**, 541.

SIR,—Dr. Robert Hutchison's comprehensive paper on enuresis (*Journal*, July 31, p. 206), following closely on the interesting correspondence on that subject, adds considerably to our knowledge of the treatment of this distressing complaint. There are nevertheless one or two omissions. The first is that enuresis is usually familial. The second concerns diet. A bland non-nitrogenous diet is the most successful, and of course milk should be substituted for tea or coffee. The best therapeutic agents are undoubtedly belladonna and the bromides. However, calcium lactate with vitamin D and parathyroid will often be found successful even in the most obstinate case. With regard to ephedrine, the only occasion on which I used it I found it made the child restless and unable to sleep.—I am, etc.,

Co. Cork, Aug. 4. P. J. SMITH, M.B., B.Ch.

Spinal Tumours

SIR,—The editorial article on the subject of spinal tumours (*Journal*, July 31, p. 220) is of much interest, but it loses in value because of its failure to take account of, or to give credit to, the pioneer work of Sir William Macewen of Glasgow on the surgery of the spinal cord. It should not be forgotten that, before Horsley and Ballance had carried out their initial operation in London, Macewen had already a solid record of successful spinal surgery behind him. In addition to this, he first in all the world gave evidence, as early as the year 1876, of the possibility of making accurate diagnoses of lesions of the central nervous system from physiological localizing signs alone.[1]

Horsley's operation was carried out in 1887; but in the years between 1883 and 1886, before Horsley was appointed surgeon to the Queen Square Hospital, Macewen reported five cases in which laminectomy had been performed for paraplegia caused by pressure, due in some instances to granulomatous tumours, on the spinal cord. By 1888 he had to his credit six cases in which the posterior arches of certain vertebrae had been removed. Four of the patients concerned made complete recoveries; one died several months after operation from the effects of advanced tuberculosis; while in the case of the sixth death was possibly hastened by operative intervention—or, at least, such was Macewen's own opinion.[2] It was Macewen's misfortune, if indeed one may look upon it in such a light, that in this period no actual neoplasm (in the strict sense of the term) of the spinal cord was encountered by him; but this circumstance, so similar to that concerned with his work on the brain, in no way detracts from his priority of achievement.

The unfriendly atmosphere in which he commenced his work on the spinal cord was amply described by Macewen at the historic Glasgow meeting of 1888.

"The spinal membranes and the cord itself," he said, "can be exposed, and neoplasms and encroachments on the lumen of the canal may be removed therefrom without unduly hazarding life. Such interference is unsparingly condemned by writers on the subject, their remarks, however, being applied to injuries, as no such operations have hitherto been contemplated in idiopathic cases. They contend that they are full of danger, being difficult, prolonged, and attended by profuse haemorrhage; secondly, that operation could hardly benefit the patient; and, thirdly, that no one has as yet been able to present a successful case. Each of these points has now lost its validity. The first operations of this kind were undertaken by me for the relief of paraplegia due to angular curvature of the spine. In such cases pressure may be exerted on the cord either by connective tissue neoplasms or by direct displacement of the bodies of the vertebrae, both lessening the lumen of the canal."[2]

At the Glasgow meeting of 1888, possibly remembering the want of recognition accorded to his work on the occasion of the presentation of the record of the Godlee-

[1] Macewen. *Pyogenic Diseases*, p. 189.
[2] —— (1888). *British Medical Journal*, **2**, 302.

Bennett case of a cerebral tumour in 1885, Macewen himself laid claim to priority in the field of spinal cord surgery, and he could not be gainsaid. Referring to his operative treatment, he remarked: "Such operations are now beginning to be practised by others. Mr. Horsley has a few months ago published the account of a successful case, in which a somewhat similar operation has been performed for the removal of a small tumour of the theca, diagnosed by Mr. Gowers."

It is but just that the work of a very great originator should not thus early be forgotten.—I am, etc.,

Dalmellington, Aug. 3. A. K. BOWMAN.

*** We would not for one moment detract from the honour due to that great pioneer of the surgery of the central nervous system, Sir William Macewen, but our leading article was concerned not with the surgery of the spinal cord but with spinal tumours and the first removal of a spinal tumour. For this there appears to be no doubt that Horsley was responsible, and the credit must be his. It may have been, as Dr. Bowman points out, Macewen's misfortune that in his early laminectomies he did not encounter an actual neoplasm, but so it was with others. In 1873 E. Leyden of Strasbourg (*Klinik der Rückenmarks-Krankheiten*, Berlin, 1874, **1**, 467) diagnosed and localized a spinal tumour, subsequently verified at necropsy, upon which he had proposed operating but was prevented from doing so.—ED., *B.M.J.*

Impacted Ureteral Calculus

SIR,—As perhaps indicating the value of expectant rather than operative treatment in cases of impacted ureteral calculus in which the patient is not a good subject for operative treatment, the following case may be of some interest.

In May, 1929, the patient had an attack of renal colic and consulted the late Mr. Frank Kidd. A radiograph showed the calculus to be impacted in the left ureter about one and a half inches from the bladder. The patient was 60 years of age, and although an otherwise healthy man weighed 16 stone. Mr. Kidd recommended no active treatment other than an occasional injection of morphine and atropine to relieve any ureteral spasm. He offered to oil the stone *in situ*, but was not very enthusiastic as to its beneficial effect; he gave it as his opinion that the stone would sooner or later complete its journey, and that so long as it gave rise to no untoward symptoms it was better left alone. Mr. Kidd saw the patient twice in the next two years, the stone remaining unmoved during that time and giving rise to no symptoms. An *x*-ray examination has been carried out once a year since with similar findings. Once only, about four years ago, has he had any inconvenience at all, and then only a colicky pain lasting a short time and relieved at once by an injection of morphine and atropine. On the morning of August 7, on rising, he passed the calculus, more than eight years after its impaction.

—I am, etc.,

Darlington, Aug. 7. J. W. ASTLEY COOPER.

Tests of Renal Function

SIR,—May I make a few comments on Dr. C. S. D. Don's article (*Journal*, July 10, p. 54) and on Dr. N. Lissimore's letter (July 31, p. 244)? In estimating renal function there are two things to be noted: in the first place, Is there a lesion present; and, secondly, What is the function of the kidney as a whole? To my mind the best test for the detection of a renal lesion is the concentration test following the technique described by Calvert of Belfast. It corresponds to the exercise tolerance test employed by the cardiologists, in that it tries to find out how the kidney will react to increased work. The Van Slyke urea clearance test, on the other hand, gives a much truer picture of the kidney as a whole and as to how it is fulfilling its function in the body. Owing chiefly to the brilliant work of Richards the tremendous amount of reserve the kidney possesses is now realized; a lesion may be present and yet the kidney function under normal conditions may be perfect.

As I remarked in the *Ulster Medical Journal* of January, 1937, the blood is the environment in which the kidney works and the urine is the result of its labours, and so both must be taken into consideration when examining renal function. The urea clearance test does what no other renal function test does, it considers the three essential factors in renal activity—the blood urea, urine urea, and the volume of urine excreted in unit time. It is thus theoretically the best test of kidney function, and I think this is borne out by every one who has given the test a fair trial. A short time ago a boy was seen with a history of tonsillitis followed by acute nephritis several months previously, and tonsillectomy was now being considered. The kidneys were unable to concentrate or dilute properly, but the urea clearance test was normal. This was pointed out to me as a case in which this test had failed. Is it not more rational to say that the renal lesion, which was obviously present both clinically and as shown by some degree of fixation in specific gravity, was not handicapping the kidney, which, as shown by the clearance test, was still doing its duty properly? That is, the kidney had compensated. This was borne out by the after-history of the patient.

If this interpretation is granted, then there are two corollaries. In the first place, in the estimation of renal function no one test should be relied on but rather the whole picture studied. The urea clearance test is intended to supplement other tests, not to replace them. Secondly, in the evaluation of the urea clearance test it is not enough just to compare it with the results of other tests. Its true value is only shown by a careful follow-up of the after-histories of patients and of their clinical condition as compared with the results of the clearance test. —I am, etc.,

Harrogate, Aug. 4. J. V. WILSON.

Abuse of Caesarean Section

SIR,—Mr. Malcolm Donaldson's letter in the *Journal* of July 31 (p. 243) in reference to Caesarean section is indeed timely in view of the deplorable fact that it is becoming an operation too often resorted to in preference to other methods of delivery which have stood the test of time and proved perfectly adequate in cases for which section is now being indiscriminately advocated. As he truly says, the operation itself is simple. It is not attended by the difficulties ascribed to it by the lay mind, with the unfortunate result that the false impression entertained by the public may, and probably does, tempt many to practise what adds to their professional reputation and income without due consideration being given to the needs of each individual case, and the best and safest way of meeting them. Mr. Donaldson will have conferred a benefit upon all would-be mothers if his warning based upon such wide and enlightened experience succeeds, as it should, in putting all enthusiasts on their guard against what may and does constitute an added danger to the risks of child bearing.—I am, etc.,

Greenhithe, Kent, July 31. D. W. STANDLEY.

The Normal Female Pelvis

SIR,—Many practitioners will welcome the article by Dr. H. Thoms in the *Journal* of July 31 (p. 210); it is one of the first in this country to try to correlate the findings of accurate pelvimetry with practical experience in obstetrics. Nevertheless measurements of primiparae in England give different results from those obtained by Dr. Thoms in America, and do not substantiate his claim that the "mesatipellic" type rather than the "brachypellic" type is the normal pelvis in white women. I have analysed a series of 300 pelvimetric measurements in accordance with Dr. Thoms's classification, with the following result:

	Dolichopellic	Mesatipellic	Brachypellic	Platypellic
Dr. Thoms: 450 cases	15 per cent.	45 per cent.	35 per cent.	5 per cent.
Moreton District Hospital: 300 cases	7 „	26 „	54 „	13 „

In England, then, the brachypellic type is still the "normal" pelvis. Moreover, the averages for the two main measurements in my series are: conjugate, 11.5 cm., and transverse 13.5 cm.—and anatomy textbooks give the conjugate as 11 cm., the transverse as 13.5 cm. These figures, which must have been arrived at after a very great number of measurements on the cadaver, have never been challenged. Dr. Thoms does not give average measurements, but it is not hard to estimate from his paper that the conjugate diameter averages 12 cm. in America, and that the transverse diameter is, on the average, less than 13 cm. Where the measurements in two peoples of common stock like the Americans and ourselves show such large variation, it seems to be impossible to define the "normal" female pelvis more closely than by saying that it is that pelvis which will support the weight of her trunk on her legs and give passage to a full-sized child at term.—I am, etc.,

Moreton-in-Marsh, Glos., Aug. 1. CLARK NICHOLSON.

When to Operate in Appendicitis

SIR,—Even a general practitioner finds the answer to Mr. R. Rutherford's letter (*Journal*, July 31, p. 244) fairly easy. The Ochsner-Sherren expectant treatment of appendicitis cannot possibly be carried out properly save in the immediate neighbourhood of an operating theatre and a first-class surgeon. The reason for this is that in a few cases spreading peritonitis may at any moment necessitate an appendicectomy which is likely to be a difficult one. If this relatively uncommon complication arises in the patient's home during the night the following risks occur: (1) the relations, or even the nurse, will value the doctor's rest more highly than they should, and not send at once; (2) a difficult operation under bad conditions, or a bumpy ambulance journey with an ill patient, may be necessary; (3) some—and probably several—hours' delay will take place when every hour is of the utmost value.

I consider it dangerous to teach this method to undergraduates, some of whom will inevitably misapply it. The simple and uniform rule—attempt removal when diagnosed—is nearly as safe, and the Ochsner-Sherren method should be taught only to the postgraduate with surgical leanings.—I am, etc.,

Woodford Green, July 31. E. B. GROGONO.

Treatment of Laryngeal Diphtheria

SIR,—When I was in practice as a superintendent of a fever hospital I obtained a considerable experience of both tracheotomy and intubation. It was with great interest therefore that I read Dr. A. Gardner Robb's paper in the *Journal* of August 7 (p. 264). I agree with him that intubation is the operation of choice—that is, in hospital practice but not in private practice. As regards instruments, I came to the conclusion that Moreau's modification of Bayeux's tubes and introducer were the best. Dr. Robb does not mention these. Bayeux's instruments were a modification of O'Dwyer's. I am under the impression, however, that in several of the large fever hospitals aspiration has taken the place of intubation.

Dr. Robb asks for information on the subject. May I be allowed to refer him to my book (*A Textbook of Infectious Diseases*, p. 204), in which he will find some statistics, though they are not so extensive as his. Statistics on this subject that can be fairly compared are not easy to obtain. May I also refer Dr. Robb to a paper published in the *Edinburgh Medical Journal* for March, 1902.—I am, etc.,

Hemingford Abbots, Hunts, Aug. 9. E. W. GOODALL.

Anaesthesia in General Practice

SIR,—I am following with great interest the series of articles on this subject. I notice that Dr. Blomfield (*Journal*, July 24, p. 175), in discussing basal narcotics' states that "pernocton . . . never found great favour . . ." in this country. In my experience this drug has given complete satisfaction. I have used it regularly in quite a large number of cases for a period of nearly three years. It has the advantage of requiring no previous preparation of the patient and is simple to administer. A natural sleep is induced with a dose of 4 c.cm. for a normal adult almost before the needle is withdrawn, and the patient never remembers anything of the journey to the theatre or the subsequent administration of ether or gas and oxygen. There are no unpleasant after-effects, and it materially lessens the amount of ether necessary when the latter is used. It may be that I have been fortunate and that I have yet to meet some of the "snags." If there are any I will be very pleased to hear of them.—I am, etc.,

H. GARNER-EVANS, M.B.

Wellingborough, Northants, Aug. 4.

Universities and Colleges

UNIVERSITY OF LONDON

Owen William Roberts, M.D., M.S., F.R.C.S., has passed in the examination for the External Diploma in Public Administration.

UNIVERSITY OF DURHAM

Under the new statutes for the University of Durham, made in pursuance of the Act of 1935, the King in Council has appointed Professor James Fitzjames Duff to be Warden of the Durham Colleges, and Lord Eustace Percy to be Rector of King's College, Newcastle-upon-Tyne. Both appointments will take effect on September 6.

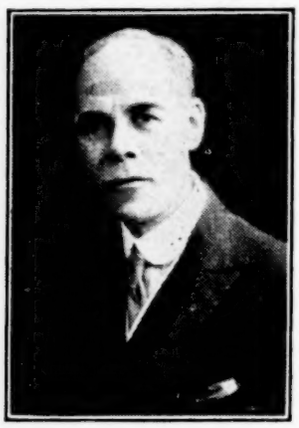
Obituary

EDWIN SMITH, M.D.

Coroner for the Western District of London

We regret to announce that Dr. Edwin Smith, Coroner for West London, died at the age of 66 on August 9, after a long illness.

The only son of Mr. Edwin Smith, of the Inland Revenue, he was born at Melton Mowbray, and was educated at Perth Academy and the Dundee High School. Dr. Smith received his medical training at St. Thomas's Hospital, where he had a distinguished career, being Entrance Science Scholar, William Tite Scholar, Treasurer's Gold Medallist, and, later, house-surgeon. He qualified M.R.C.S., L.R.C.P. in 1892, took the London M.B. with honours in 1894, and the M.D. in 1895. In 1908 he was called to the Bar by the Middle Temple. For some years Dr. Smith was the London University Lecturer in Forensic Medicine and Toxicology to his old hospital, and also examined in forensic medicine at Oxford University. Before being appointed Coroner for West London, he was Deputy Coroner for Westminster and South-West London. He contributed articles on medico-legal subjects to the *Practitioner's Encyclopaedia of Medicine and Surgery*, and the section on medico-legal problems in Fairbairn's *Practitioners Encyclopaedia of Midwifery and Diseases of Women*.



Edwin Smith was a man of strong convictions and, on occasions, outspoken in his criticisms of the profession to which he belonged; his comments a few years ago on the home treatment of insurance patients gave rise to a storm of protest. Characteristic of him was his remark on a man afflicted with an incurable disease who had committed suicide: "This man did for himself what any man would have done for a dog." "Suicide," he said on another occasion, "is the only enterprise where, if you succeed, you are called insane. If you fail you are supposed to be sane." It is not surprising that he held the view that a strong case could be made out for the use of the lethal chamber for those undergoing prolonged suffering incapable of relief. As a result of his experience as coroner he was a firm advocate of safer roads, and had little patience with those whose carelessness exposed themselves and others to danger, deploring the fact that cyclists were not made to carry rear lamps.

Dr. Smith was a man of many interests, chief among which were music and magic. A contribution of his to the *Musical Times* was entitled "On Faulty Sensations of Musical Pitch, with Notes of a Personal Experience." He was a member, and chairman of the council, of the Magic Circle, and himself invented a number of tricks, the best known of which was the "E.S. ring and rod."

Dr. Smith in 1910 married Edith Catherine, daughter of Mr. H. D. Dyer, and had one son and two daughters.

Mr. S. INGLEBY ODDIE, Coroner for Central London, writes: Dr. Edwin Smith came to me some seventeen years ago to ask if he might make a study of Coroners' Law and procedure in my courts, as he was deeply interested in medico-legal subjects and was a member of the Bar. He was at that time in a busy general practice in South London, but he found time to attend my office and courts almost daily for some months, and quickly mastered the details of practice in the Coroner's Court. When a vacancy arose I was glad to appoint him my deputy, and he served in that office efficiently and well until he obtained the appointment of Coroner for North-East London, and later, in 1930, for West London.

Edwin Smith was a shrewd and highly intelligent man, and this, coupled with a kindly and sympathetic nature, made him a very competent and useful coroner, and although he had no practical experience of the law his years spent in general practice as a doctor proved far more useful to him when dealing with the mass of medical problems which came before him every day. He carried on his work quietly, carefully, and expeditiously, and did not pander to the sensational press, seeking rather to get to the root of the matter, to abolish suspicion where there was no real ground for it, to ease the burden of distress which falls on the relatives, and to arrive at the truth.

His personality was unusual, for he played no games, was practically a teetotaller, was a non-smoker, and apparently took no exercise and but little holiday. He was happy, however, in the possession of two hobbies—music and conjuring—and he had an ideal home life. His children and his wife shared his musical enthusiasm, and all played either the violin, the piano, or both, and he often spoke of the pleasure he got from his family orchestra. He was a brilliant success as a medical student, and in later life exhibited a sound, simple common sense which must have endeared him to his patients and afterwards to those who appeared before him in his courts.

It was characteristic of his kindly nature and thoughtfulness that he should have left instructions that the announcement of his death should not be made until after his cremation, thereby avoiding the fuss and formality which he detested.

Dr. F. TEMPLE GREY writes: In the passing of Edwin Smith both medicine and law have lost a very competent practitioner. After a brilliant scholastic career he went into general practice, where he gained a knowledge of men and medicine which made it difficult for a medical witness to theorize overmuch: his training in the law gave him a firm grasp of the principles on which an impartial inquiry should be conducted. His shrewdness made his work of great value to the State, and his advice was sought by many. Like so many outstanding men he was very approachable, for he combined with thorough efficiency a charming personality—a combination rare enough to make his passing a matter of regret to the State and of grief to his friends. His friends—and he had many—will miss him sorely.

[The photograph reproduced is by the Topical Press Agency.]

REGINALD FRANCIS JOWERS, F.R.C.S.

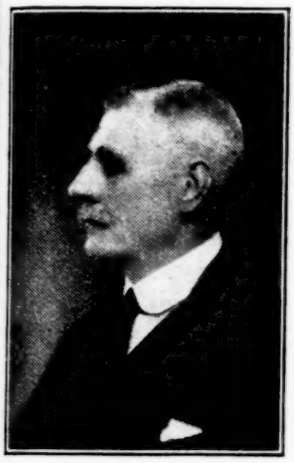
Consulting Surgeon, Royal Sussex County Hospital, Brighton

We regret to announce the death on August 7 of Mr. Reginald Francis Jowers, consulting surgeon to the Royal Sussex County Hospital and the Victoria Hospital, Lewes.

Mr. Jowers, the second son of the late Mr F. W. Jowers, F.R.C.S., qualified L.S.A. in 1885, M.R.C.S. and L.R.C.P. in 1886, and was elected F.R.C.S. in 1888. He received his medical education at St. Bartholomew's Hospital, where he held the posts of house-surgeon and

resident obstetrical officer. Subsequently he was resident clinical assistant at the East London Hospital for Children. For the following appreciation and account of his career we are indebted to Mr. Hugh N. Fletcher.

For many years Mr. Reginald F. Jowers was an outstanding figure in Sussex, and was known not only as a surgeon whose exceptional skill was sought far and wide, but as a man of great charm and character. After Winchester and St. Bart's days he became house-surgeon to the Royal Sussex County Hospital, Brighton. In 1889 he was appointed honorary assistant surgeon and in 1901 honorary surgeon to the hospital, an active connexion which lasted until his retirement under the time limit in 1921, when he became consulting surgeon. He was also honorary surgeon to the Victoria Hospital, Lewes, and to King Edward VII Hospital, Haywards Heath, for some years. During the war he was a member of the "à la suite" of the 2nd Eastern General Hospital and served with the rank of lieutenant-colonel. He had been a member of the British Medical Association since 1889, and acted as Vice-President of the Section of Surgery when the Association met at Brighton in 1913. Throughout its long history the Royal Sussex County Hospital has never had a more devoted servant, or one whose work brought to it greater distinction.



Jowers was a big man in every sense of the word. Tall of figure and of handsome presence, his keen and vigorous personality gave a sense of power wherever he went, and when one watched him at work this impression deepened. Every problem of diagnosis and treatment was met, not only with wide knowledge, but with a rare common sense and wisdom which rarely allowed him to go astray. For a man so busy it was remarkable how deeply he read. Everything that could be of future use was stored in a retentive memory and annotated and filed in his records. Jowers's chief characteristics as an operator were courage, decision, and an almost uncanny judgement of what best to do under difficult circumstances. It was perhaps this quality of sound judgement which gained him so fully the trust of his colleagues. Not apparently a quick operator, he nevertheless got through an enormous amount of work in an afternoon and seemed never to tire. The high standard that he demanded of himself he also required in others, and no slackness of any kind was allowed to pass. Duty was to Jowers a watchword which was never broken under any circumstances, and his example in this respect must have been an enduring inspiration to many generations of house-surgeons who worked for him. He hated sham and insincerity and incompetence, and was sometimes very outspoken, but always with the courage of his convictions. None the less, he had the kindest of hearts, and one of the happiest traits in his character was his love of children.

In his prime, and his prime seemed to last right up to the time of his retirement, Jowers's reputation brought him work which must have taxed his strength to the utmost. He was trusted implicitly by doctors and patients alike, and few have more richly deserved such confidence. Indeed, overwork probably brought on the distressing illness which clouded the last few years of his life. Suddenly, soon after his retirement from practice, when he was looking forward to more leisure and to the enjoyment of the sports dear to his heart, he was struck down by subacute combined degeneration of the spinal cord. Some of us wondered how such an ardent temperament would face the disappointment and inaction which such an illness meant. But it brought out a greatness of spirit and a courage which was the more poignant because one knew the self-discipline which it must have entailed.

And so has passed one whose memory will be cherished by many a staunch friend, and a true man who greatly served his time and generation. He will be especially missed by those who were privileged to know him in his home, or to share in those country pursuits, fishing, shooting, and golf, which he enjoyed with such light-hearted, almost boyish, enthusiasm. To his family, and especially to his widow, whose constant and unselfish devotion sweetened the lot of a sorely tried spirit and softened the hardship of long suffering, the thoughts and sympathy of all will go out.

Medical News

The annual dinner of the Chartered Society of Massage and Medical Gymnastics will be held at the Café Royal, Regent Street, on Wednesday, September 22, at 7.30 p.m.

The second International Congress of Gastro-enterology will be held in Paris from September 13 to 15, on the occasion of the World Exhibition, under the presidency of Professor Pierre Duval. The following subjects will be discussed: (1) early diagnosis of gastric cancer; (2) acute and chronic obstruction of the small intestine. The Paris congress will be followed on September 16 by an International Congress of Hepatic Insufficiency at Vichy under the presidency of Professor Loeper of Paris.

The twenty-first International Congress on Alcoholism will be held at Warsaw from September 12 to 17. Particulars can be obtained from the honorary secretary, 33, Bedford Place, Russell Square, London, W.C.1.

Notice is given in the *London Gazette* of July 30 that a petition of the Dean and the Chairman of the Council of the London (Royal Free Hospital) School of Medicine for Women, praying for the grant of a Charter of Incorporation to the school, has been presented to His Majesty in Council; and, His Majesty having referred the petition to a committee of the Lords of the Council, all petitions for or against such grant should be delivered at the Privy Council Office on or before August 31.

The National Advisory Council and the Grants Committee for Physical Training and Recreation issued on Thursday a booklet called *National Fitness—The First Steps* (H.M. Stationery Office, price 2d.). It is primarily intended for the use of local authorities and voluntary organizations, but the Council hopes it will be of interest to the public as well. This discusses briefly the objects in view in the campaign for national fitness, and many possible methods of promoting them. The powers of local authorities are indicated and the extent of the grants which may be made towards the capital cost of approved schemes. The grants will vary from 25 to 75 per cent. of the accepted estimate of costs according to local needs and economic circumstances, but do not provide for aid in maintenance except in cases of special hardship. The booklet lists finally many of the national voluntary organizations interested in the campaign, and the twenty-two Area Committees which are being set up in connexion with it.

The King has reappointed Dr. V. W. T. McGusty, O.B.E., to be a Member of the Executive Council of the Colony of Fiji for a further period.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone, unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the *British Medical Journal* must communicate with the Secretary, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors over-seas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

All communications with reference to ADVERTISEMENTS should be addressed to the Advertisement Manager. Orders for copies of the *Journal* and communications with reference to subscriptions should be addressed to the Secretary, B.M.A. House, Tavistock Square, W.C.1.

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The TELEGRAPHIC ADDRESSES are
EDITOR OF THE *BRITISH MEDICAL JOURNAL*, *Attiology Westcent, London.*
SECRETARY, *Medisecra Westcent, London.*

The address of the B.M.A. Scottish Office is 7, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh;* telephone: 24361 Edinburgh), and of the Office of the Irish Free State Medical Union (I.M.A. and B.M.A.), 18, Kildare Street, Dublin (telegrams: *Bacillus, Dublin;* telephone 62550 Dublin).

QUERIES AND ANSWERS

Vaccine Reactions

"RURAL G.P." writes: A patient suffering from chronic catarrh was given an autogenous pneumococcal vaccine at intervals from January to the middle of March. She was persistently overdosed, and an exacerbation in the form of very severe headache, at times one-sided, accompanied by an urticarial type of facial rash, has persisted since the last dose of vaccine. Treatment by glucose, calcium gluconate, and whole blood injections has had no effect. Is the condition a permanent one? If not, how long can it be expected to last, treated or untreated?

Parathyroid Secretion

Major W. GUYON RICHARDS (London, W.1) writes: In the interesting article on parathyroid secretion in the *Journal* of May 1 (p. 929) it is stated that since parathyroid extract is destroyed in the alimentary canal it is therefore worthless when given by mouth. This is not my experience, and my practice is to give an indicated drug with the glandular preparation. Some years ago, when practising at Burgess Hill, we had a considerable number of cases of varicose ulcers of the legs, which were treated by simple dressing and parathyroid extract given orally. The results were excellent, in marked contrast to those obtained before the parathyroid extract was given. There was no need to give calcium, as our water supply contained this in abundance, and the parathyroid fixed it in the tissues. Is not the word "destroyed" a wrong one to use in this connexion, surely "changed" would be more correct? Parathyroid extract given by the mouth can be a valuable addition to other treatment, and is even effective when used alone under conditions like those at Burgess Hill. Possibly with a needed addition it acts as a catalyst. Injection may be more efficient, although in some hands it is risky, but in cases in which it is not feasible it is certainly possible to obtain results by oral administration.

Irish Medical Folk-lore

Dr. M. G. KIERANS (Co. Monaghan), prompted by Dr. Maguire's note (*Journal*, July 31, p. 252) to the effect that the aetiology of itch was long known to the Irish peasantry, writes: An old lady in County Armagh advised a patient of mine who was anaemic to steep minced liver overnight in cold water and to drink the liquid in the morning. She informed him that she had cured her own daughter of anaemia by this treatment over thirty years previously. I remember a boy, thirty years ago, who was treated for anaemia in a similar manner, raw beef being used instead of raw liver. An Irish scholar recently informed me that Irish manuscripts contain many medical references. This is to be expected in the records of a high civilization, and raises hopes that medicine too will benefit from the revival of Gaelic learning.

Income Tax

Interest on Deposit Receipt

"ALPHA" explains that unknown to him a lady instructed her solicitor to place £200 on deposit. She died on June 22, 1936, and "on October 8, 1936, this deposit . . . with the sum of £29 11s. 9d. interest" was handed over to "Alpha." Is he liable to pay tax on the interest?

*** When money is placed on deposit receipt the interest does not arise, and is therefore not liable to tax until it is "uplifted." Apparently this has not yet taken place, or did not take place until after the deposit had been legally transferred to "Alpha." In that case he is liable to account for the tax on the £29 11s. 9d. as being the person entitled to the interest at the time it became liable to assessment.

Depreciation of Radium and Apparatus

"ELEMENT" bought 100 mg. of radium in 1933, the cost of the radium being £1,200 and the cost of the containers, lead safe, instruments, £226. The cost of radium has dropped, and its present value is now, say, £750. Can he claim any deduction for the depreciation?

*** There is no general allowance for a wasting asset except for depreciation of plant and machinery by reason of wear and tear. It would probably be held that this does not cover the case of a radium equipment, except possibly as regards the safe and instruments. On the other hand it might reasonably be contended that the use of the radium involves some expenditure of its force, and—on the analogy of a stock of a particular drug—the cost should be spread over the probable effective life of the radium acquired in 1933. That would involve reopening the assessments for 1934-5 and subsequent years. In no case can an allowance be claimed on the ground that the present cost is below the actual cost in 1933.

LETTERS, NOTES, ETC.

Pregnancy Tests in Missed Abortion

Dr. T. D. CULBERT writes: A patient, a multipara aged 44, became pregnant in December, 1936, and this diagnosis was verified by two consultant obstetricians. Early in March there was some uterine bleeding, and after two weeks on morphine and rest in bed this subsided, although she lost a fair amount of blood. Neither foetus nor placenta were passed. In May I was called to see her for a recurrence of the bleeding, and the abdomen was no larger than two months previously. This time it was much less severe, and the patient was soon up and about. I told her I doubted that she was pregnant, and thought that her condition was possibly menopausal. Early in July she brought me a specimen of urine; an Aschheim-Zondek test proved negative. I was called to see the patient on July 23, and found she had passed a complete macerated three-months' abortion. This is the first time I have come across a case of "missed abortion" in which an Aschheim-Zondek test was carried out. The result, a perfectly correct one, was a little misleading in view of the patient's age.

A Safe Milk Supply

The importance of pasteurization for ensuring a safe milk supply is emphasized in a memorandum entitled "The Production, Inspection, and Laboratory Control of Milk," issued by United Dairies, Ltd., 34, Palace Court, London, W.2. Raw milk from tuberculin-tested herds can be, within reason, guaranteed free from tubercle bacilli, but not from those of contagious abortion, which cause undulant fever; from mastitis, which predisposes the animal to become a carrier of the organism that causes septic sore throat; and no herd testing can prevent the contamination of milk during or after drawing with scarlet fever, typhoid, diphtheria, and other germs. "In addition to safety the public have a right to demand a milk that will keep a reasonable time under household conditions. For this we require a pasteurized milk with a comparatively low count of souring organisms. To attain a satisfactory standard in this respect a 'clean milk' is essential for pasteurizing." The importance of proper cleaning and sterilizing of buckets and other utensils used for handling the milk is urged, as well as the need for cleanliness of milkers' hands, overalls, and caps